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# ENGINEERING & MINING JOURNAL-PRESS

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## *Direct Trade in Silver Between America and India*

By R. D. Birla

Chairman of the Bullion Exchange, Bombay

## *Crushing 2,500 Tons of Rock Per Shift*

By A. W. Allen

## *Capping as a Guide to Copper Deposits*

By Graham John Mitchell

## *Model Industrial Government at Bauxite, Arkansas*

By Tom Shiras

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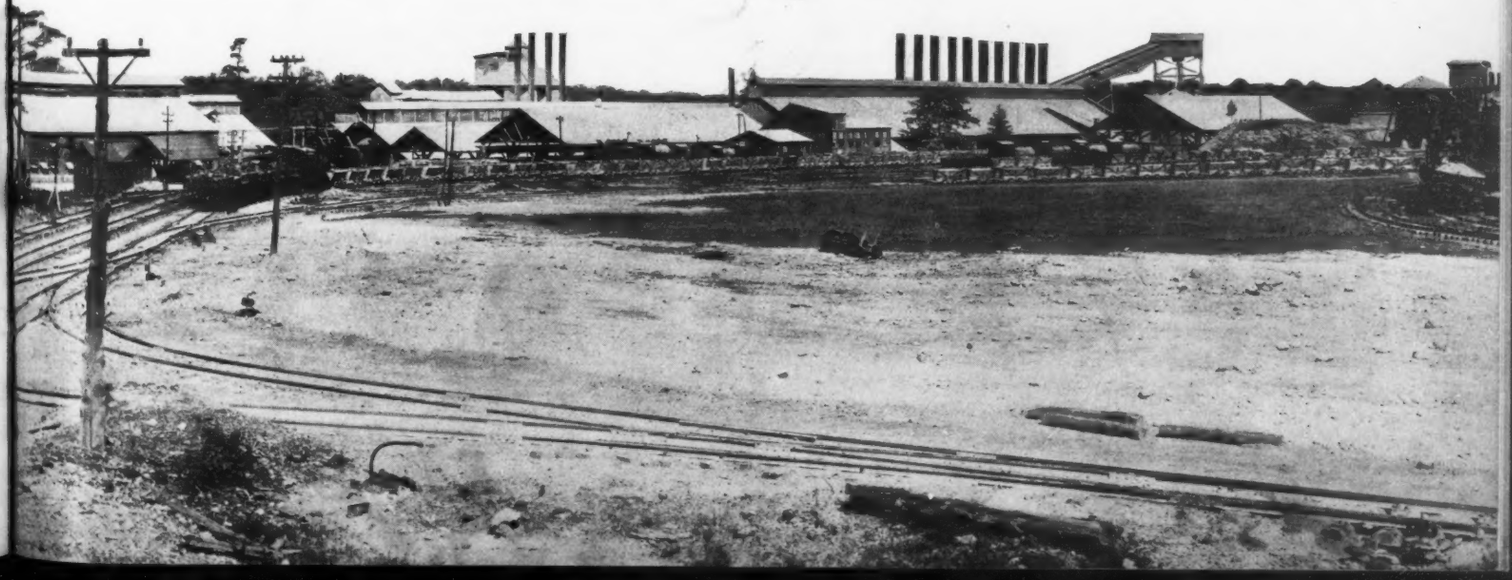
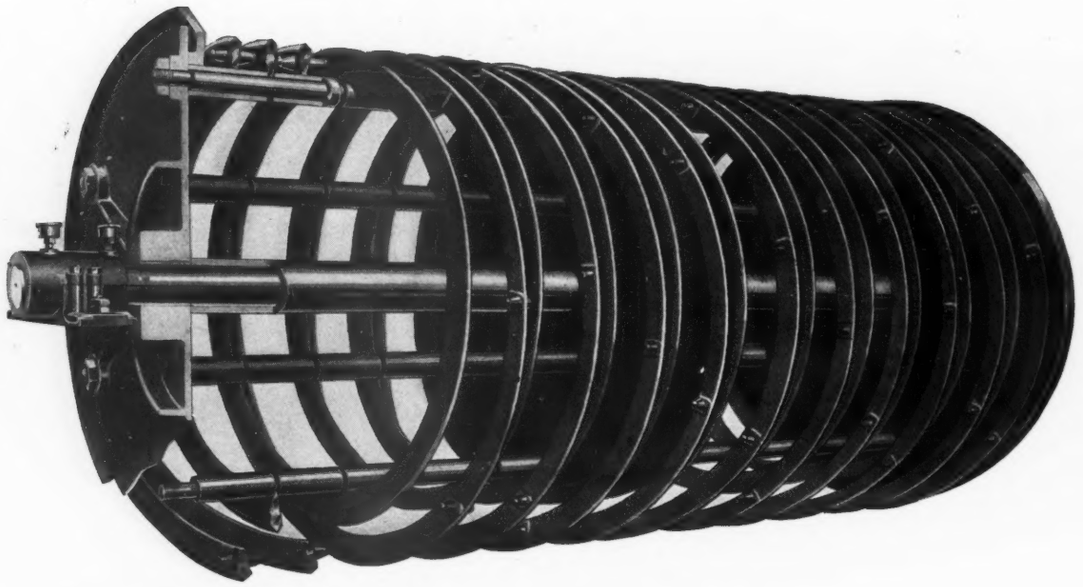
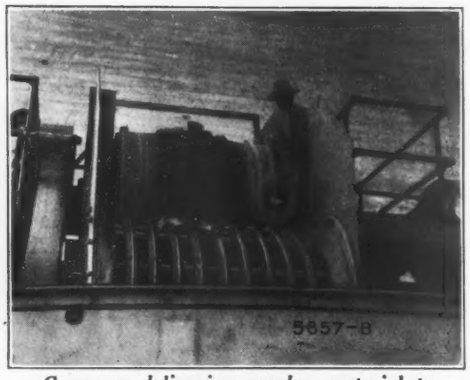
**Plant of the American Bauxite Company at Bauxite, Ark., which supplies most of the world's aluminum ore. The company is a subsidiary of the Aluminum Company of America**







*Conveyor delivering crusher material to Burch Grizzly.*

*Looking down past Burch Grizzly into crusher*

## *An "Ace" for the "Queen"*

Out in Bisbee at the Copper Queen is one of the earliest installations of Burch Grizzlies. From the standpoint of expediting separation of the fines from crusher sizes this installation is the "ace" of the Copper Queen.

The Burch Grizzly is absolutely non-clogging, the ingenious arrangement of fixed and loose rings provides accurate spacing at the top while giving complete freedom of release for the fines.

Built in three standard diameters: 36, 48 and 60 inches, and in any width up to ten feet. The ring spacing can be adjusted for specific requirements.

**STEPHENS-ADAMSON MFG. CO.**
*Aurora, Illinois*

# BURCH *Grizzly*

ENGINEERING & MINING
JOURNAL-PRESS
JOSIAH EDWARD SPURR, Editor

*Volume* 116 New York, November 24, 1923 *Number* 21

## A Far Eastern Slant on the Silver Market

A PROMINENT SILVER PRODUCER of both domestic and Mexican silver was asked by us a few days ago whether his company sold silver directly to some of the large silverware manufacturers in Connecticut, New York, and other states. He said that even the largest consumers in the jewelry centers required relatively small amounts of the metal compared with the outlet in other directions and that most of them obtained their supplies from brokers and dealers willing to cater to that trade. The output of his company was sold through banks having Asiastic connections or through London to consumers in China and India. Sales were generally made in large lots, 100,000 oz. or over.

This situation brings out a fact that is fundamental in any discussion about silver: The greatest consumption of silver takes place in the Far East in India and China. The amount of silver bought by American manufacturers and European governments for coinage purposes is not nearly so important as that absorbed by our Asiatic friends. Axiomatic and platitudinous as this statement may seem, it should not be lost sight of by silver miners in their effort to improve the market for the white metal.

In all the agitation among producers so far—culminating in the formation of an export association—the voice of the miner, smelter, and dealer has been heard. London has also expressed itself, if not officially then indirectly. But the most important consumers have been singularly silent on these American activities, probably for the reason that their great distance from the United States precludes close contact and discussion. Hence the article appearing in this issue from the president of the Bombay Bullion Exchange is valuable and highly significant. In so far as the paper is representative of responsible Indian opinion it would seem that Indian consumers welcome more direct trade relations with American producers. This in itself is a significant declaration. In the last analysis, however, trade flows in those channels which offer the least resistance to it. If direct trade with India can be established more cheaply and advantageously than through London, producers will look upon the arrangement with favor. But London is not easily eliminated.

The objections which our contributor makes to the present practice of establishing the London quotation are well taken: the closed proceedings of the four bullion brokers do not permit free and easy trading in the world's principal market. It denotes deliberate thought on the part of Mr. Birla that he decided to come out squarely with his criticism of the marketing system as conducted by the London quadrumvirate. But these objections and others that have been advanced from time to time in these pages are not likely to result in any voluntary change in the system. In a spirit of true British conservatism, the brokers will hardly be moved.

An important word of warning is uttered by our contributor when he advises American producers to avoid attempting artificial control of the market. This is a game at which two can play. However, we do not believe that the sentiment of the most influential silver miners inclines to artificial manipulation and that there is any longer much to worry about on that score.

All we need now is a message from some representative Chinese merchant and we will have heard from all the interested parties to the present silver movement.

## Lead Mining in Southeast Missouri

SOME MINING DISTRICTS are much more popular with traveling mining engineers, out to see the latest practice, than others. The Butte district is rarely missed, nor is Salt Lake; and Bisbee-Douglas, Globe-Miami, and other Arizona mining localities are well known to most of us. But we understand that the mining, milling, and smelting practice of Southeast Missouri is not so often included in the itineraries of wandering engineers. Possibly they think that the practice there is not generally applicable or interesting; or that the operators are still living in the Clam Age and do not relish visitors. If they have any such thoughts, they are wrong.

The "Lead Belt" of Southeast Missouri is easily reached from St. Louis. Leaving the flat Mississippi Valley we soon reach a beautiful, rolling country studded with hardwood and coniferous trees—the foothills of the Ozarks. The Mississippi River here begins to be beautiful, with limestone cliffs along its banks. There is none of the mean and desolate look characteristic of so many mining regions. Like the Michigan "Copper Country," the Missouri "Lead Belt" has been treated well by Nature, on the surface as well as underground. Sixty-five miles from St. Louis—two and a half hours—and we are there.

From the surface one must go through limestone or dolomite to reach the galena, which lies in horizontal beds of varying thickness. Then, at about 600 ft., comes several hundred feet of barren sandstone, and below that granite, also barren so far as known. The vein miner will find himself in strange surroundings. The stopes are broad and flat, with here and there a massive pillar, but not a stick of timber in sight. Where the beds are thicker, the roof is a hundred or more feet high—sometimes imperceptible in a slight mist. The aspect is that of an immense cavern. Conditions are almost ideal for mechanical shoveling, and in a brief visit to one mine we saw two shovels at work; one of them with a 13-cu.ft. bucket, a heavier machine and requiring more headroom than the other, which is of the St. Joe type. The smaller shovel has fewer parts and can work in more confined areas. Both are proving

the solution of an inadequate labor supply and incidentally cutting mucking and loading costs to about 65 per cent of the former figure, including depreciation.

Another interesting sight is a car-dumping tipple, which is being increasingly used, and by which three mine cars at a time, each holding 2.7 tons, are inverted and dumped into a 1,200-ton ore pocket. Trains of thirty cars, without uncoupling, holding eighty tons in all, are dumped in five minutes by one workman. These points are only a suggestion of what the district holds for the man interested in mining.

The ore is all concentrated, six plants now being in operation, with another soon to be pressed into service. Jigging, tabling, and flotation is the common practice. The short-head gyratory is doing phenomenal work crushing two- or three-foot chunks to two inches. At the different plants are to be seen various kinds of ball and rod mills, Hancock jigs, dewatering devices, tables, and flotation machines. Drum filters and driers get the moisture down to about 8 per cent for shipment to the smelter. Rubber conveyor belts are freely used in all of the plants.

Smelting is slightly different from the common practice, owing to the adaptability of the table concentrates to reduction on so-called Scotch hearths. But any lead metallurgist, or even a copper metallurgist, can find much of interest. And in the persons of Mr. Warner at Herculaneum, Mr. Porter at Federal, and Mr. Newnam at Collinsville the visitor will find three genial hosts. The smelting equipment includes Newnam hearths, D. & L. sintering machines, H. & H. pots, blast furnaces, refining kettles and reverberatories, casting and loading machines, and the necessary flues and bag-houses. Much that is new and interesting has been developed and the plants reflect the prosperity of the lead industry. All three smelters are easily accessible from St. Louis by train or trolley.

Certainly, Southeast Missouri is well worth a visit.

## The Science of Geology

GEOLOGY has not yet attained the practical ring that goes with physics or chemistry; yet, like them, it is a science; it is also, like them, an earth science. Geology is not in the high favor in colleges and with college presidents that it should be; its relative importance in the curriculum of studies and in the partition of appropriations has diminished. Something is wrong—not, of course, with the subject matter of the science, but in the way it is treated by geologists. The answer appears to be that the geologist has not treated his science in the scientific spirit; he has too much of the ecclesiastical reverence for tradition, authority, and dogma; he has a suspicious scent for heresy; and is inclined to solve arguments by citations from the elder sages. We refer to the rank and file of geologists—chiefly those connected with colleges and to a lesser extent with other institutions. With some of these, their position as instructors of youth tends to confirm them in their dignity and their reverence for authority, which principle involves the reverence for their own authority. Such as these shrink from naked nature and from its messages for fear that nature might instill into their minds some idea traitorous to Lyell or Dana; but more than by the dead masters their timorous intellects are dominated by the living elders—whether these be sound, or hollow more or less to the core. The sciences of physics and chemistry proceed by experimentation and checking; facts are their first and last test; and thus they have far outstripped geology.

Applied geology is the true science of geology, according to the above interpretations. The practitioner of geology works, in mines or elsewhere, from actual local facts, draws logical deductions therefrom, checks these deductions by further observation, and, more important, by underground physical exploration; and so continually orients himself anew by the arduous but sound methods of true science.

The times are still upon us—or, if past, they are barely past—when the old rank and file of geologists looked down with caste prejudice upon the student of applied geology, and declined to recognize him as a scientist. But also now the times are upon us—or if not, the shadow of their coming is clearly visible—when the student of applied geology considers the geologist who has not practiced his science, who has not applied and checked it, as no true and qualified scientist, but as unproductive, and an obstacle to the progress, the clarification, and the widespread recognition of the science of geology.

## Why Merge?

STRANGE INDEED are some of the combinations that are suggested in the rumors regarding copper mergers that find their way to New York from Arizona and the Southwest. There is no doubt, however, that officials are giving serious thought to the question, and that at least tentative proposals have been made. Moreover, these preliminary negotiations involve properties that are in no way connected from the standpoint either of ownership and control or of physical proximity. The question is frequently asked what benefit can be derived from such a merger. It is easy to see how economies may be effected in the operation of adjoining properties—such as those composing the Calumet & Hecla Consolidated—as a single unit instead of as individual mines. It is just as easy to see how a number of small properties, widely separated, might be run more economically if they were controlled by a single company; overhead could be reduced by sharing the costs of efficient management, of large-scale purchasing, of advantageous marketing, and of the most expert technical advice. But why merge companies which operate properties hundreds of miles apart and whose mines are large enough easily to warrant the most complete executive and consulting organizations?

The answer probably lies in the peculiar situation in which the copper industry finds itself today. Suppose two copper companies: A is operating at 80 per cent capacity, producing 8,000,000 lb. of copper per month at a fair profit. B, likewise at 80 per cent capacity, is producing 6,000,000 lb. of copper at an actual operating loss of a few cents per pound. Then suppose a merger of the two companies were effected. Mine B would be shut down at once and by adjusting the staffs and intensifying effort the production of A would be increased to the maximum 10,000,000 lb. Profit would be increased largely, and enough might be earned to pay a dividend to all the stockholders of the combined company. The copper in mine B would be conserved until such time as definite improvement in the economic

situation would make the mining of it profitable and the life of the new enterprise would be lengthened. Likewise the production of the combined properties would be 4,000,000 lb. less than before, and by that amount the apparent current overproduction would be reduced. That ought to please everybody. Another thing: fewer miners would be required and something would be done to relieve the general shortage of mine workers. Still another advantage would be that, when it became advisable to restart property B, the nucleus of an operating organization could be transferred from property A.

Looked at from the broader economic aspect the merging of, say, five or six companies instead of two presents the obvious additional advantage of creating a strong corporation that would be influential in stabilizing the market.

If the matter is considered thoroughly it appears that the higher-priced producers are not the only ones that would benefit, although as their situation is the most critical, they doubtless would have to take the short end of the financial arrangement whereby consolidation was effected. Certainly, no thinking person will argue that a developed copper deposit equipped with all the plant required for production is valueless merely because the metal market at the moment will not permit profitable operation. On the "long pull" copper mining is sure to prosper, and some appraisal ought to be possible of any of the well-known mines. Obviously an agreement on the terms for any such merger would be a difficult matter; that is probably the reason why no more definite progress has been made in the negotiations to date. Many companies depleted their capital reserves during the shutdown of 1921, and an individual company might have serious difficulty in successfully weathering another long period of inactivity. A merger with companies whose present position is stronger is one way to meet the situation.

## The College Handicap

AN IMMENSE AMOUNT OF STUDY is being given by colleges to courses of instruction, the proper arrangement and proportion of studies. This is an important question. Quite as important, however, is a phase of the college problem to which little attention is given—the psychology of college students. Yet it is precisely this around which the chief contentions pro and con college training are waged. There are always with us the competent and articulate successful and intelligent men who do not regard college graduates enthusiastically, at least until they have had the college layer worn off, if it will wear off. What these men object to is not the intellectual acquirements of the graduate, which they do not doubt. They believe that the student has lost more in some directions than he has gained in others—that while he has advanced immensely in English, mathematics, and what not, he has lost in common sense, humor, modest self-appraisal, the ability to establish a true contact with those he meets. And this is superinduced, too often, by the retired atmosphere of a college, by the prominence given in the newspapers and other periodicals to college events, by the attention of the public to intercollegiate sports, by the detached and superior air which the faculty throw around themselves. All this tends to make many a college student imagine himself, with his youthful lack of experience and balance, as quite at the apex of the universe, and to adopt the bearing which goes with this position. These four or six years of more or less distorted outlook are a handicap which the non-college youth does not have to suffer under. Of course, in the meantime he may suffer an even greater handicap of environment. Nevertheless, it is true that this psychologic element is not second in importance to curriculum as a university problem and that almost no intelligent study is being given it by the colleges.

A phase of this mental infirmity is the tendency to make the college course appear the summit of a man's life, from which he gradually slides down as the date of his callow graduation recedes. The effort is made to brand him as a species according to his college. Class reunions and movements endeavor to keep this alive. Graduates are instructed that loyalty requires sending their sons to old Yale or old Dartmouth; and as years roll by the ancient graduate almost deludes himself that the current formula is correct, and that those were the good old times. Some graduates never mentally survive their graduation, but remain professional Princeton men or Harvard men to the end of their tiresome days.

These observations apply far more to the general courses in college leading up to the "arts" degrees than they do to the special schools of engineering and medicine, or even law. But it is considered by nearly all colleges highly desirable, if it is not imperative, to take an arts course, or at least a year, or two, or three years, of liberal studies, for general culture, before undertaking the technical course; so that this psychologic problem is one that effects engineering students as well. If it would be possible to extract the thorns from the rose of learning, to attain the fruits of knowledge without the blight of conceit and the withering of the human ties that bind all humanity closely together, then we should have an end of hearing the big men who are constantly decrying the usefulness of the college product.

## Marketing Silver from San Francisco

SILVER exports at San Francisco for the first nine months of 1923 have totaled 37,508,524 oz. and have averaged 4,167,613.7 oz. per month. The business is now concentrated in relatively few hands, due principally to the transpacific bullion rates, which are on a sliding scale. Silver bullion valued at $10,000 or under must pay a rate of $10 per $1,000 of value. Shipments amounting to $350,000 in value, or over, pay a rate of $3.75 per $1,000 of value. Thus to secure the lowest rate it is necessary to ship 538,461 oz. in one lot when silver is at a value of 65c. per oz.

Small transactions are at a great disadvantage, as is apparent. A flat rate, on the other hand, would place both large and small transactions on an even basis and would undoubtedly stimulate the number of individual transactions, the result of which would be to create a local silver market that would benefit the silver miner. The gross returns to the steamship companies would not be materially less by the establishment of a flat rate. It is to be hoped that any future readjustment of transpacific silver bullion rates will be on the basis of a flat rate. This appeals to us as the fairest way to handle a situation which has been monopolized by a few large bullion handlers.

# Direct Trade Between India and America in Silver

*A Consumer of the Metal Believes That Stimulation of Closer Business Relations of East and West Is Better for Producers Than Attempted Market Control*

By R. D. Birla
Chairman, the Bullion Exchange, Ltd., Bombay, India

ALTHOUGH America produces nearly 80 per cent of the world's total production of silver, and India and China together consume nearly 75 per cent of it, the price at which this huge quantity changes hands is fixed by a third party — London, neither a producer nor a consumer of any importance. London has been doing this service for many years through her four firms of brokers who fix the price

*Wife of an Indian Swabwa, a minor native official*
Note the numerous silver ornaments—bracelets, necklace, headdress and other decorations

from day to day. It is claimed they do so according to the demand and supply of the metal represented by the selling and buying orders in their hands on a particular day.

Unlike other commodities, there is no negotiation, no bargaining about the price, no open market where both the sellers and buyers can fix their price; on the other hand, the price fixed by these disinterested arbiters of the fortune of the producers as well as the consumers is the price at which almost the whole of the world's production changes hands.

One might ask with some surprise how it happens that the destinies of thousands of producers and millions of consumers, the former as far west of London as the latter are east, have become vested in the hands of the four firms and whether this arrangement gives full satisfaction to the parties concerned.

### London's Strong Financial Position

Reasons for this position are not far to seek. London enjoys the credit of being the financial center of the world, which facilitates the financing of the silver trade. The Government of India's purchases and the purchases of the English banks which formerly enjoyed the monopoly of this trade in the East were naturally made through London. This made London the principal market for the metal. The settlement system of the Indian bazaars requires the punctual arrival of the metal on the expected date, and this requirement is met by the regular mail service between London and Bombay. Then there is, perhaps, a sort of conservatism or prejudice among the Americans which debars them from creating direct trade relationship with the East and makes them employ the unnecessary service of London. The prejudice is largely the outcome of their ignorance and want of first-hand knowledge of the East.

Now, this peculiar system of marketing the metal is like shooting in the dark. You may hit the mark, but the chances of missing are greater unless the order is to be executed at market rate. In the latter case the buyer or seller often finds that he has purchased or sold at a price at which he cannot sell or buy in his own country. This is so because at the time of sending orders the sellers are ignorant of the demand and the buyers of the supply of the metal. London is midway between the principal producers and the principal consumers, and each day both send their orders for execution to London, each ignorant of the quantity the other has got to sell or to buy, and so it often happens that large offerings come on a day with poor demand, and vice versa. The result is a sharp fall or a sharp rise, followed by equally sharp reactions, and the unfortunate purchaser whose order happens to be executed at the crest, and the unfortunate seller who sold at the trough, both find themselves victims of mere chance.

All commodities fluctuate in price, but as a result of world conditions. The fluctuations in silver are more often the result of the condition of things at 2.30 p.m. in the offices of the four brokers in London. Such a limited market for so important a commodity naturally fails to satisfy either the producers or the consumers. In the case of the other commodities, the principal markets exist where those commodities are produced or consumed, and at all such markets the interests of both the producers and consumers are well represented and they can well watch their own interests. They may sell or buy at their own discretion, which they can exercise with open eyes in an open market. The fluctu-

*Photo Arthur B. Parsons, "Journal-Press"*

*Where the world's silver goes*

Even the poorer people in the Far East have their silver trinkets with which to bedeck themselves. Note the silver neckpieces. The reader may judge how much of the white metal is consumed in India by considering that there are 300,000,000 of these people.

ations then only reflect the world's supply and demand, and no one has ground for complaint. No sudden excessive supplies are followed by equally sudden shortages, and the price of the commodity is generally stable, though subject, of course, to world factors. However, this is not so for silver, and hence we have the spectacle of sudden slumps and sudden rises, and a cry in America for stabilizing the price of silver.

### The American Attitude

The American silver interests not only resent the want of stability of silver due to the process of fixing the price in London, but having realized a dollar per ounce from the government for so many years, feel that the market price around 64c. is too low for their product. This has led them to think of forming an association to control exports by means of marketing the whole product through that association.

Though stability of price is a good thing and an attempt to realize high value for one's goods not unnatural, I doubt whether the object would be gained by the unnatural and arbitrary method of control, which is worse than the London method of fixing. Silver is largely a byproduct, so its production cannot be restricted in the usual way. Hence the control can only take the form of cornering the total production, and this the Americans desire to do through the agency of the proposed association, which would finance the corner and manipulate it so that the demand might always remain in excess of the supply and thus the price might be pushed up or maintained at a comparatively higher level. The process at first sight appears plausible, but overlooks the important fact that as far as India is concerned silver is, after all, a luxury and has a big competitor in gold. Any large increase in its price sufficient to make the corner profitable would reduce its consumption, and the Indian masses would give preference to gold, which is more attractive, handy, and which the uneducated hoarding classes can more easily hoard than silver.

Cornering silver is not the same thing as cornering wheat or cotton, which have to be financed for a season only, but corners and high prices of even such necessaries reduce their consumption. There is no seasonal production of silver, and its corner can only mean a permanent corner and a permanent investment of funds which could be utilized more profitably in other ways. India buys large quantities not only of silver but also of gold, and between the two preference is given to the cheaper metal. During the early part of this year, the season when the offtake was highest, the highest offtake of silver did not exceed about 2,400 bars (2,500,000 oz.) a week, which is about 60 lacs (6,000,000) rupees' worth of silver weekly, while the offtake of gold was as high as one lac[1] tolas[2], or over rupees 24 lacs' worth daily (about $750,000), because gold, which was below rupees 25 per tola, was comparatively cheaper than silver, which was about rupees 80 per 100 tolas. This would show that gold has not got less charm than silver as an investment or an object of hoarding. Any rise in price of silver is bound to reduce its consumption, which would defeat the object of control. The control can be successful only if the consumption of the whole product can be guaranteed at the price demanded by the controllers, which is quite absurd.

If we look at the problem from the viewpoint of

[1] A lac is a unit meaning 100,000 pieces.

[2] A tola is a weight equivalent to $\frac{3}{8}$ of an ounce troy.

China, we come to the same conclusion. First, the stocks of silver in Shanghai alone amount to over one year's production of the United States. Second, the rise in silver would mean a rise in her foreign exchanges, which would restrict the export trade of China and reduce the favorable balance of trade, which in turn would react on her demand for the metal. Third, even if the balance of trade remains unaffected, a higher price for silver would result in the buying of a smaller quantity of silver.

### Arbitrary Control Ineffectual

It is thus clear that neither stability nor higher price can be secured by the arbitrary control. The need is for creating those conditions which occur in case of other commodities—namely, open markets in the producing and consuming countries without interference by a third party and the flow of business between them on equal footing. This can be done by fostering direct business relation between America and the East. America should not only remain content with inviting offers from India, but should also send offers and operate in the Indian market in co-operation with Indian merchants or through its own representatives.

So far as India is concerned, she would welcome direct relations with America, but the latter appears to be still shy. America seems to be ignorant of the vast changes that have taken place in India in the course of a decade, during which time India's trade has shown large expansion. There was a time when the import of bullion was a monopoly of a few exchange banks and the market was wholly in their hands. The mere gestures of any of the banks would have raised or depressed the price by a rupee or more. Now those days are gone, and the business has almost wholly passed out of the hands of the banks; they have to satisfy themselves only with financing imports. The business is now in the hands of Indian merchants, who are in many cases more in touch with the world factors influencing the market than the banks themselves. Furthermore, these merchants obtain information from all corners of the world and deal in all markets, London, China, and America.

### Indian Markets Well Organized

America has not yet realized that Bombay has become a very wide market for silver—wider than even New York or Shanghai. Shanghai has in fact no market for silver, while in New York it is not easy to buy or sell, say, a thousand bars in one lot any day. In Bombay buying or selling a thousand bars in one lot is not an unusual thing. The settlement system imparts great elasticity to the market, of which the foreign merchants can take much advantage. In some respects the Bombay market is wider than even the London market. The London silver market means the four firms of brokers. If you want to sell any quantity any day, you cannot know what price it would fetch; you do not, even if you are in London; you cannot know the demand on that day. All that you can do it to place your orders in their hands to be executed at best price or at given limits, or at their discretion. In each case you are a helpless spectator of the whole play. You cannot use your discretion. You can know how much the metal was in demand on that day only after the prices are fixed and your order is executed, and it is impossible to increase or decrease or cancel your order. It may happen that a selling order is placed on a day when there is no demand and itself becomes a cause for a depression of prices.

In Bombay the market is open from 10 in the morning till 5 in the evening, and the fluctuations in the market reflect not only the demand of Bombay alone but of the whole of India and even China. The opening rates of Shanghai reach there at opening time and merchants receive cables of fluctuations of ½d. or even ¼d. in Shanghai. If one desires to buy or sell any quantity any day, he can do so at his own discretion, he can choose the time when he should sell or buy during the course of the day, and he can himself decide what quantity to sell.

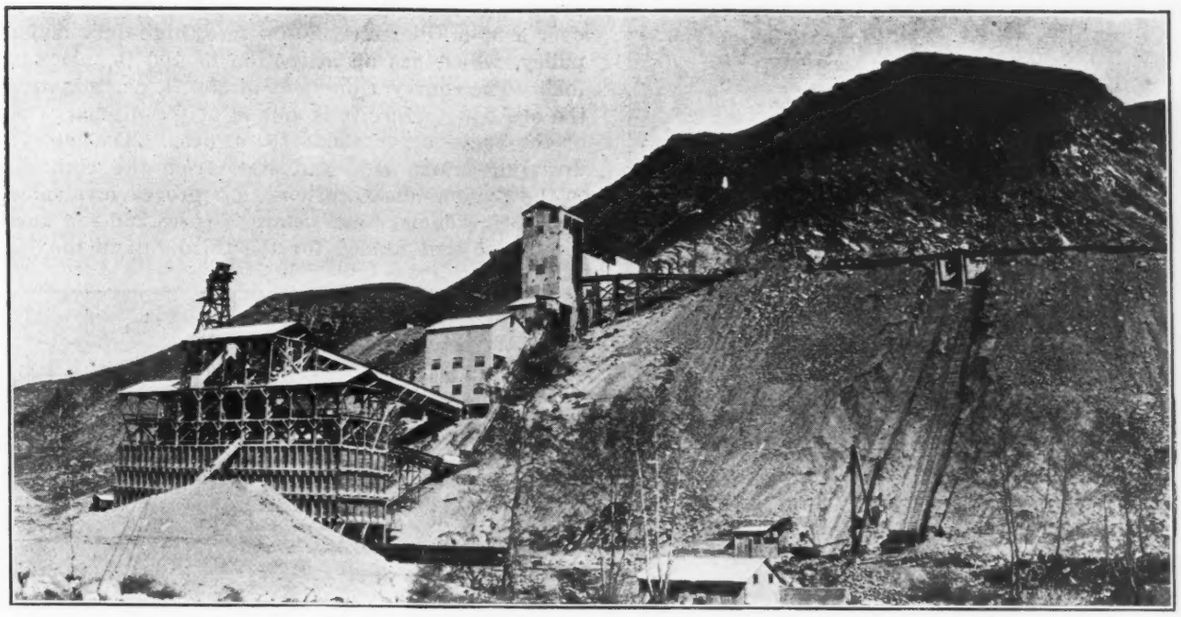
The business of Bombay is in the hands of reliable firms of sound standing and great integrity. Thousands of bars are bought and sold daily on word of mouth, and the contracts are confirmed in the evening. No dispute has ever arisen about the transactions. The whole business is organized and controlled by the Bullion Exchange, which has on its directorate the biggest bullion merchants of Bombay. The exchange will soon have its own building at a cost of over a million rupees, with all the modern facilities for business, offices of banks and bullion merchants, and vaults for storing silver, which will make it worthy of the big bullion market of the East.

### Improving Direct Trade Between East and West

India is already importing increasing quantities of silver from America direct, and but for the absence of better facilities would have already begun to import a greater portion from America. India goes to London simply owing to the great facilities obtainable there. The regular weekly mail service, which takes two weeks for letters and three weeks for the bullion to arrive, the facilities of covering foreign exchange, are the great attractions. America can easily arrange these facilities, and, together with cheaper freight, would outbalance those afforded by London. At present it is not as easy to buy dollars here as sterling, and the importers have to take the risk of two exchanges in financing through London. Japanese banks are further advanced in this respect, and any amount of Japanese yens can be bought or sold with as much ease as sterling. This has given a great stimulus to the cotton business between India and Japan.

German trade with India had increased because of the far greater facilities it afforded than other competitors. Germany would offer her goods not only for delivery at the Indian ports but inland centers as well.

America has a great opportunity of increasing her direct bullion trade with India, which would prove to her more advantageous than attempted control. America should sell her silver not only in America or London but also in India, the only country which consumes so much silver for non-coinage purposes. It should not rest content with filling the orders sent to it from here or selling here through banks, but should offer the business direct to the merchants. This would not only save it many commissions and brokerages that are unavoidable in doing business through banks, but will also earn for it the confidence of the merchants and would be a great help in developing the business. This direct business will not only give larger profits to the silver interests but also to the banks and the shipping and insurance companies. It will also indirectly help development of other trade and business between the two countries.



*Blue Diamond Materials Co.'s crushing plant and storage bins near Corona, Calif.*

# Crushing 2,500 Tons of Rock Per Shift at Corona, Calif.

*Blue Diamond Materials Co. Has Efficient Plant to Mine and Break Hard Material—Screening and Dust Collection Feature Operations—Storage Capacity Large*

**By A. W. Allen**
Assistant Editor

THE ROCK-CRUSHING PLANT at Corona, Calif., now operated by the Blue Diamond Materials Co., of Los Angeles, was designed by John Schreiner. It embodies many features that indicate efficient planning and the utilization of up-to-date equipment. The magnitude of operations is evidenced from the fact that the output is nearly 5,000 tons per two shifts.

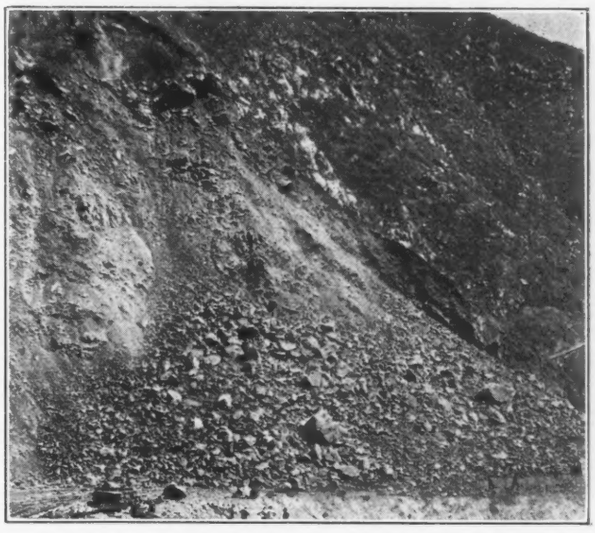
The plant and quarry are situated in what is known as Hoag's Canyon. The company's holdings cover 1,100 acres of a deposit of high-quality porphyry rock, which is mined by the tunnel or coyote system. From 45 to 125 tons of powder is used per charge, the resultant blast bringing down from 600,000 to 1,500,000 tons, the "shooting" cost varying from 2 to 2¼c. per ton. The mining and blasting practice is under the direction of J. C. Cushing, technical representative of the Hercules Powder Co., who visits the mine when the face is ready for shooting. The bench which is now being quarried is approximately 350 ft. high and 1,200 ft. long.

### Steam Shovel Loads Into Seven-Ton Cars

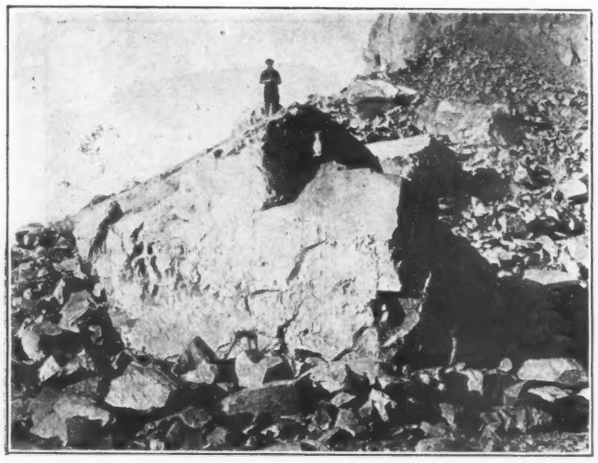
The broken rock, a small proportion of which must be bulldozed before it can be handled by the dipper, is delivered to special cars by means of a Marion steam shovel, model 11, with a 4-yd. dipper. The Woodford system of haulage was used originally, but this has recently been replaced by two sixteen-ton Davenport steam locomotives, each of which hauls six cars holding seven tons of rock apiece.

A mammoth jaw crusher takes the steam-shovel product and reduces it to 10 in. at a rate up to 1,000 tons per hour. The size of the receiving opening is 84 by 66 in., and manganese-steel liners are used.

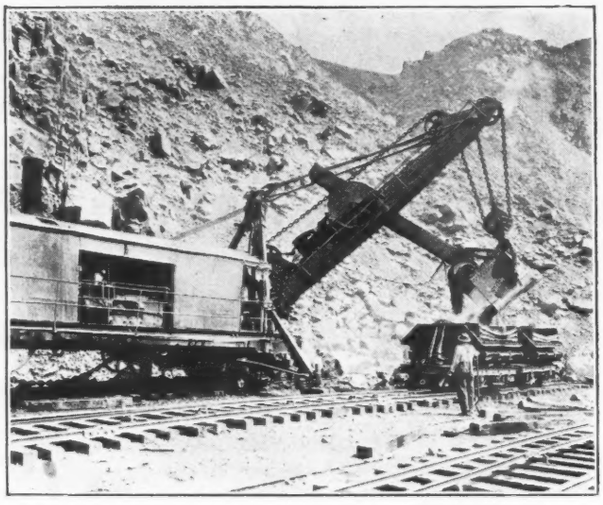
The operation of secondary crushing is performed in one No. 9 standard McCully gyratory, three vertical and one horizontal 48-in. Symons disk crushers and one 24-in. horizontal Symons disk crusher. The discharge



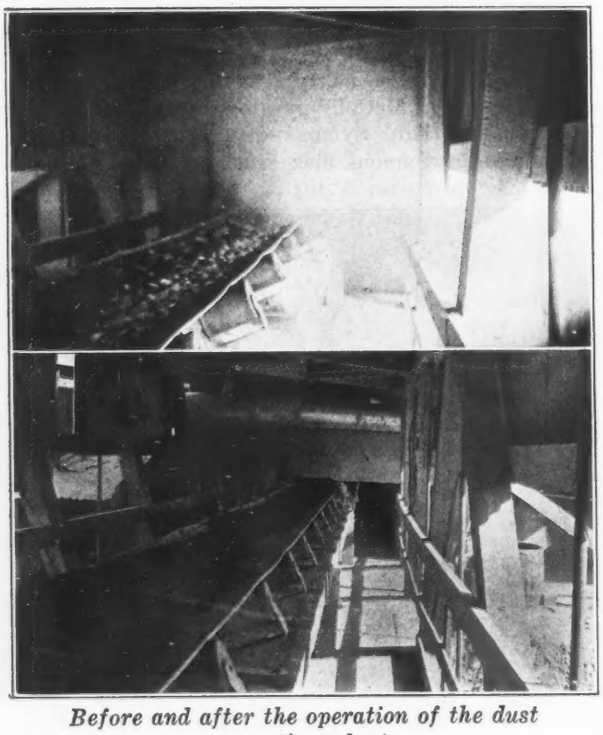
*The result of a blast*



*Too big for the steam shovel*

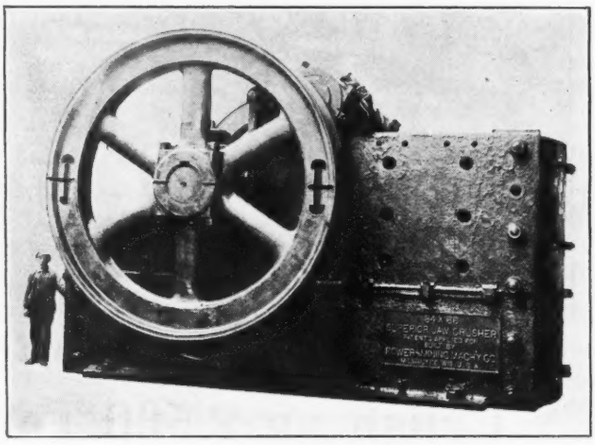


*Marion steam shovel, Woodford cars and third rail supplying current for their operation*



*Before and after the operation of the dust arresting plant*

from the McCully crusher passes, by belt conveyor, over a 36-in. diameter, 30-in. face, high-duty magnetic pulley, which has an attraction of 100 lb. per square inch. The conveyor operates at 200 ft. per minute, and the ore flow, before it is spread at the discharge point of the conveyor, is about 10 in. deep. The pulley, by diverting tramp iron and steel from the rock going to the Symons disk crushers, has proved invaluable in preventing damage and delay. It uses 250-volt current similar to that needed for the third rail in the Wood-

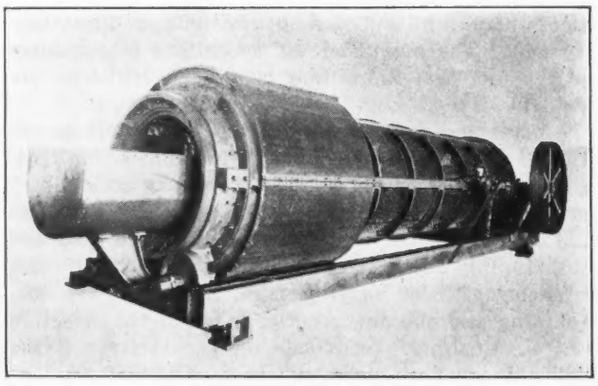


*Primary crusher at Corona*

ford haulage system. A feature of this particular magnetic pulley is provision for ample ventilation, thus permitting a powerful magnetic action without danger of the destruction of the insulation on the coil wire by overheating.

### Screening Is an Important Part of the Work

The original screening plant, erected by the Temescal Rock Co., consisted of two 60-in. by 16-ft. McCully scalping trommels, the screen sections, of manganese



*Type of trommel used at Corona*

steel, having 2½-in. holes; and one 60-in. by 21-ft. McCully trommel with the following screens, also of manganese steel: 9 ft. with 1¼-in. perforations; 6 ft. with 2-in. perforations; and 6 ft. with 2¾-in. perforations. This trommel also has an 8-ft. dust jacket composed of two sections, each 4 ft. long with ⅜-in. perforations.

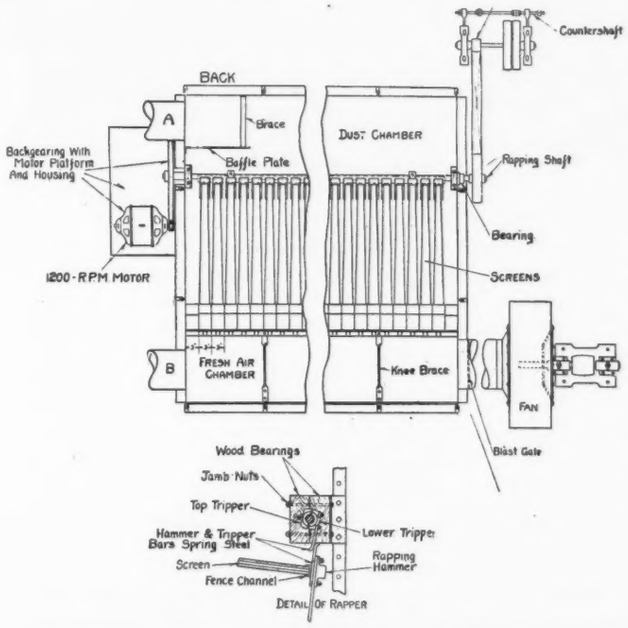
Early this year the Blue Diamond company added one 60-in. by 30-ft. McCully trommel, having the following dimensions: 9 ft. of screen with 1¼-in. perfora-

tions and 6 ft. of screen with 2-in. perforations. This screen has a dust jacket 16 ft. long made of wire cloth. The first 9 ft. of the dust jacket has 2-mesh openings; the last 7 ft., 3-mesh openings. Previous to this the company added a 60-in. by 24 ft. McCully trommel, with manganese-steel screen sections, the first 9 ft. of which has 1¼-in. perforations; the remainder, 2-in. perforations. A wire-cloth dust jacket provided has 2-mesh openings.

The total trommel length provided for the screening of the present output is 108 ft. Manganese-steel trommels have found much favor for this work, largely because of rugged construction and good wearing qualities.

### Dust-Collecting Equipment Works Well

The Sly system of dust collection is used at Corona, the equipment consisting of two type A units, with 3,000 sq.ft. of cloth screen area, using 10,000 cu.ft. of air per minute each and collecting one and a half




*Plan of Sly dust arrester unit, with detail of rapper*

tons of dust per hour. In this installation a housing around certain of the trommels permits the abstraction of dust by suction. Special cycloidal exhaust fans are used, the vanes or blades of which are set at an angle to the shaft. The dust-laden air passes into a settling chamber, the coarser particles being diverted downward by a baffle. A cloth filter is used to collect the fine dust, an exceedingly large surficial area being arranged in a small space. The deposited material falls into conical bins, equipped with valves at the apices, the freeing of the dust from the surface of the cloth being insured by stopping the suction for ten minutes every four hours or so, to allow operation of a tapping device, which jars the screen surface. The dust from the Sly plant is marketable and is sacked for shipment.

The rock products made at the Corona plant are as follows: No. 1, 3 to 2 in.; No. 2, 2 to 1 in.; No. 3, 1 to 1¼ in.; No. 4, ⅜ to ½ in.; No. 5, known as fracture stone dust; and No. 6, ⅛ to 3/16 in. All but the finer

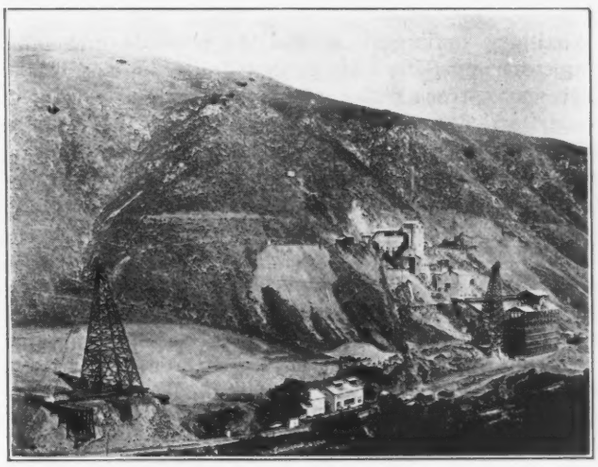
*Dust-sacking plant and chute*

sizes are used for concrete work, particularly in connection with that incidental to highway and building construction.

The storage facilities at Corona comprise a bin with a capacity of 6,000 tons and a ground-storage system. The latter consists essentially of one fixed and one movable tower of timber construction, each 135 ft. high. One of these is mounted on rails so as to be able to describe the arc of a circle with a radius of 800 ft., the track being about 450 ft. long. The other tower remains central, and the two are connected by a 2½-in. lock-strain Hercules cable, a swivel bearing being provided at the stationary tower. On the cable runs the necessary equipment to operate a 2½-yd. Hayward bucket of the power-closing type. Unloaded the bucket weighs seven tons; loaded, from ten to twelve tons. The propelling machinery operating the bucket consists of a hoist with a 300-hp., G. E. slip-ring motor, taking 3-phase, 60-cycle, 440-volt current. The movable tower is operated from the power house by what is known as an endless line system. The total available ground storage capacity is about 200,000 tons.

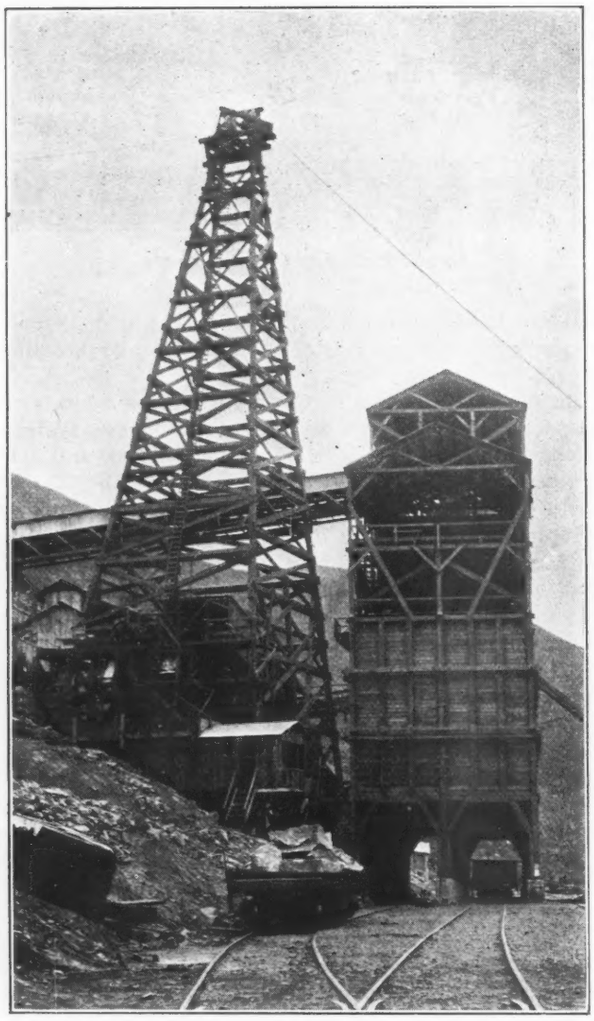
### Complete Auxiliary Plant Cuts Costs

Rock is stored in the open when bin capacity has been reached, being reclaimed from the pile by the grab bucket and dumped on a platform alongside the storage



*Towers, one stationary and one movable, of the ground-storage system*

bins when occasion arises. This platform also takes crushed and sorted rock from the trommels, to which it is transferred by belt conveyor. The grab bucket removes stone from the platform to the ground storage, or vice versa. From the platform, the rock reclaimed from the ground storage is delivered to railroad cars by chute and conveyor.



*Stationary tower, with bins and railroad track*

Auxiliary equipment around the plant is unusually complete, comprising fully equipped machine and blacksmith shops, track scales, magazines for 100,000 lb. of powder, and five miles of railroad with standard 75-lb. rail construction. One mile of this consists of yard track on a 1 per cent grade, which is ideal for gravity loading. The total power requirements of the plant aggregate 1,750 hp.

The plant and property is under the supervision of George Haines, who was employed by Mr. Schreiner in the initial construction work. F. C. Jones has charge of the office; he also oversees the business of shipping and of meeting demand with supply in a manner that indicates the value of a combination of geniality and energy. For much of the information contained herein and for sundry courtesies that permitted the compilation of these notes we are especially indebted to K. M. Grier, of the executive department, and John Schreiner, the production manager.

# Judge Gary Confident of the Future

### *The Outlook Is Good, He Says, and Opportunities Are Many*

"THE FIRST ESSENTIAL to the welfare and prosperity of a nation and all its people is protection—that is, safety of property and persons, the uninterrupted maintenance of law and order," said Judge Elbert H. Gary recently at the dinner of the American Iron and Steel Institute in New York. "For this everyone is responsible, more or less—private individuals, public officials, every department of government, municipal, state and national. For the specific administration of government affairs, responsibility is placed upon executive branches, and very much depends upon the attitude and disposition of officials. Therefore the people naturally look to the White House with anxious and hopeful eyes whenever there is a new occupant.

"If the business men will do their part and cooperate with the President and his assistants in conducting their affairs in conformity with the high ideals which we believe actuate the President in the performance of his duties as the Chief Executive, there is no reason to fear there will be a serious financial or commercial disturbance or depression during the next few months.

"There are, as always, some hindrances to the natural progress and prosperity in the United States. Those patent to everyone are the turbulent conditions in other countries; the unreasonably high and burdensome taxes, national, state and municipal; the high costs of production, in some lines unconscionable; and the high costs of living, measurably, though not altogether, brought about by those who complain the most.

"But there are many reasons for confidence in the economic future of this country, outside of those which are basic and permanent, including our enormous wealth and immense yearly income, which increases as the years go by.

"For the calendar year the iron and steel industry will show considerable profit, though not as much as the capital invested should produce. The new orders are not up to productive capacity, but together with those heretofore accumulated, have resulted in large shipments. In some lines of business the demand for immediate consumption has been, and still is, in excess of the ability to supply.

"It may be stated with confidence that the outlook is good. Inquiries for iron and steel are unusually large, many of them urgent. Purchases for railroad and general building purposes, for oil development and production, for canning purposes, for the automobile trade and many other lines are now very large as a total, and from appearances may be expected to materially increase in volume during the next six months, unless something unforeseen and something unwarranted shall be precipitated.

"The actual purchasing necessities of our commodities are very great at present, and there is plenty of money to pay for whatever is needed. It is up to business management in every line to take advantage of the opportunities offered. Let us have faith in the future and do our part, proceeding always with good judgment, prudence and within the limits of our resources, but steadily forward toward the goal of the prosperity which we know is ahead and which will be greater than ever before."

# Capping as a Guide to Copper Deposits

*Detailed Study of the Gossan Overlying Copper Orebodies May Lead to the Establishment of Principles That Will Aid in the Search for Other Occurrences*

**By Graham John Mitchell**
Chief Geologist, Cananea Consolidated Copper Co.

VARIOUS recent technical articles dealing with the geological characteristics of copper gossans have emphasized the importance of a thorough study of the surface overlying bodies of ore and have advanced the theory that such a study, if really exhaustive, might bring out enough points of similarity between all copper cappings to enable one to predict from surface indications alone the presence of underlying deposits of ore. At the present time, however, there is undoubtedly a paucity of dependable criteria whereby one can determine with any degree of accuracy the existence of ore beneath the surface when no definite indications of copper are in evidence above. Furthermore, it must be admitted that conditions existing in one case do not necessarily parallel those evidenced in another, although it is true that many features are often so nearly the same that it would seem it might be possible to formulate some rules of correlation—that, logically, certain principles should be generally applicable. It is neither to corroborate nor disprove this theory but rather in the hope that the following data, by presenting a few additional observations, may aid in the ultimate summing up of testimony, that this paper is written.

## Suggested Method of Study

There are various methods of procedure in conducting a study of gossans. A convenient system is to ask one's self the following questions:

1. What kinds of rocks are present? Are there one or more types involved? If the rocks are of igneous origin, are there different phases in evidence, some of which may have contained pyrite alone and some both iron and copper sulphides? What is the areal distribution of each and its mode of occurrence?

2. Does the surface rock indicate the presence or former existence of sulphides and, if so, what were they? Were they disseminated or did they fill fractures and crushed zones? Was the mode of occurrence that of irregular replacements?

3. Are there other minerals, the casts of which when filled or stained with oxidized iron, might be confused with former sulphides?

4. Does the oxidized rock give evidence of fracturing and faulting which influenced primary mineralization and subsequent alteration? Is this fracturing along zones or of general occurrence? Are these breaks closely or widely spaced?

5. What evidence is there as to the extent of erosion?

6. What is the nature of both the past and present ground-water level?

## Indications of a Favorable Prospecting Area

The surface may show an igneous rock in contact with sedimentaries, the region in proximity to the contact giving evidence of mineralization in the form of contact minerals such as garnet, epidote and specular hematite. Reddish and yellowish iron as staining and earthy masses and also of botryoidal, reniform or nodular habit may be present as oxidation products. Copper staining by chrysocolla, malachite or azurite proves the presence of original copper-bearing minerals, the remnants of some of which may be found upon close examination of the contact zone. The presence of copper sulphides in the adjoining igneous rock is an indication of the possible source of the metallization solutions. When the above conditions are in evidence, the area would undeniably be favorable for prospecting operations.

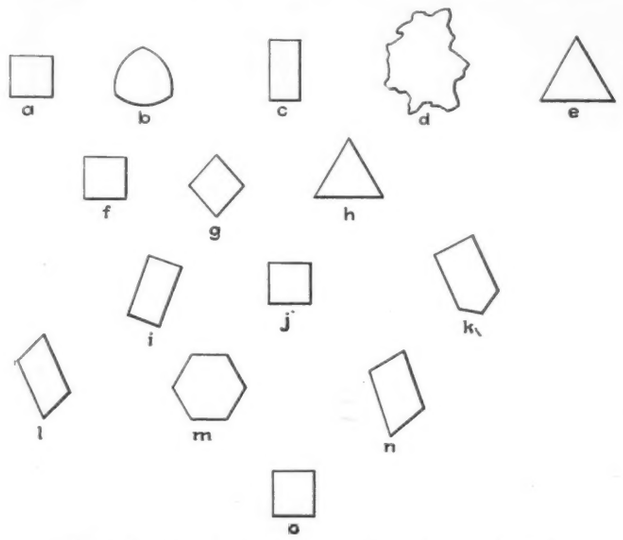
*Silicified, mineralized and iron-stained capping of a copper orebody. The rocks involved are limestone and diorite*

A contact zone, such as the one suggested above, is sometimes marked by faulting with a crushed area lying between the less disturbed formations. Where such a movement has taken place, the ground has been broken up into blocks of both igneous and sedimentary rocks which show varying degrees of alteration. I have examined zones of this character where the blocks had been mineralized with copper and iron sulphides, these being disseminated through the rock and also filling fractures cutting it where, acting in conjunction with quartz, they formed a cementing material which bound the broken fragments of rock together. As a result of this same cementing process large masses of rock were welded firmly together, these now appearing after subsequent weathering and erosion as huge misshaped outcrops. During weathering, some of the igneous fragments, which were in a large measure composed of basic feldspar, were altered and leached, the feldspar being changed to kaolin and the sulphides to iron oxides. When these decomposed blocks crumbled and were washed out of the more resistant portion of the matrix, they left caverns stained and partially filled with iron. In some instances copper staining remained. The cementing material consisted of iron and iron-stained quartz, the quartz in part having a banded structure. The iron minerals resulting from oxidation were earthy hematite, earthy limonite and turgite. The ore extended

from within a few feet of the surface to a depth of 300 ft., the lowest level to which mining was carried. The primary mineralization consisted of pyrite and chalcopyrite with patches of galena and sphalerite. Enrichment in the form of sooty chalcocite made the ore of commercial grade.

### Multiplicity of Igneous Rock Confuses

When igneous rocks are in evidence one or more types may be present. If but one class of rock exists, for example, monzonite or granite porphyry, the problem will of course be less complicated than if several varieties occur. In the case of a single rock, its surface distribution may be determined and areal studies may be confined to its outcrop. When the formation to be examined has been delimited, the question of whether or not it contained primary copper sulphides and how such minerals occurred in the rock must be answered. If unaltered primary copper sulphides remain in the oxidized surface, such evidence is conclusive. However,

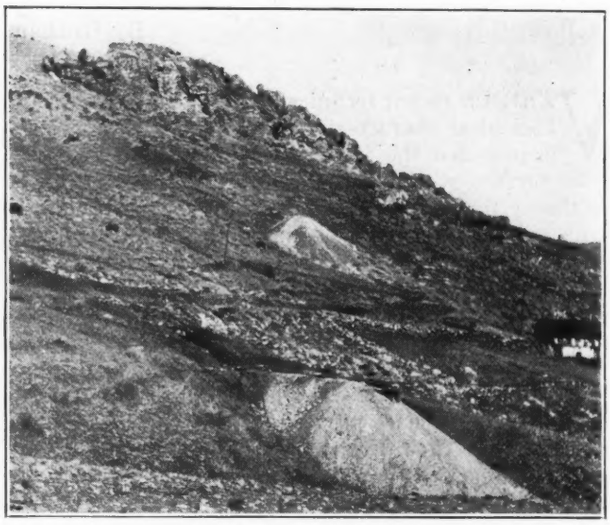



*Sketch showing sections of various minerals*

*a, b, c, d, e, pyrite. i, j, k, feldspar. n, pyroxene.*
*f, g, h, magnetite l, m, hornblende. o, galena.*

that is seldom the case and deductions must as a rule be based upon other criteria, among which are the casts of decomposed minerals.

In recognizing in the cast of an altered mineral its original nature, the shape or outline is given considerable weight as a means of identification. In order to determine the outline which different minerals assume when exposed in a rock surface, I have examined sections of mineralized rock where the sulphides and other constituents were fresh or only partially decomposed. The accompanying sketch shows the results of some of these observations. It is evident that the similarity of form in certain instances may lead to confusion and incorrect deductions. For example, the cast of pyrite in the section *a* is the same as that of magnetite *f*. These forms were examined where the minerals were both fresh and altered. The character of the oxidation products in the altered specimen gave no basis for differentiation. Similarly, form *e* of pyrite and *h* of magnetite may be confused. Section *j* of feldspar when decomposed and filled with iron oxide resembles pyrite *a*. *C* may be mistaken for form *i* of feldspar. The outline of pyrite as shown in *b* is of interest in that it simulates the form of basal sections of tourmaline. The pyrite aggregate represented by *d* was found in some instances to contain chalcopyrite which showed alteration to sooty chalcocite while in other cases no copper was evident in the partly decomposed sulphide. In all



*Brecciated and silicified outcrop of igneous rock in contact with limestone and associated with copper ore*

of the irregular masses examined, the nature and amount of iron compounds left in the cast did not afford evidence from which safe deductions could be drawn regarding the presence or absence of former copper minerals. Aggregates of rock minerals in a partially decomposed condition were noted and had these been completely altered and stained with iron they would have been difficult to distinguish from the pyrite above noted. It is evident that under conditions of complete decomposition the identity of the original mineral on the basis of form alone is not always dependable.

*View of outcrop shown above looking along the strike*

Structural features influence both primary mineralization and the secondary alteration which follows. A broad sheared zone has a strong influence upon the course followed by mineral-laden solutions and in a large measure determines the loci of ore deposition.

Zones of this nature will also permit surface waters to percolate to greater depths and thus bring about more profound secondary changes in the deposit. Minor structures, such as fractures and joints, increase permeability and aid in primary metallization and secondary alteration. The recognition of these features in the surface is an important step in differentiating favorable from unfavorable prospecting ground. In one instance of a brecciated zone, the outcrop was seen to stand in relief, the less resistant formations surrounding it having been weathered away. Further inspection showed that the more durable nature of the capping was due to the cementing material, chiefly chalcedonic quartz, which bound the broken rock together. When, as frequently happens, the binding substance is less resistant than the matrix, as is the case when it is composed of sulphides alone, the breccia disintegrates, sometimes forming a marked depression.

### Study of Primary Mineralization

Fractures and joints are often readily discernible in the surface rock because of the nature—the color or other distinguishing characteristics—of the minerals which fill them. When these openings are filled with quartz and included sulphides, they are valuable evidence in determining the nature of primary mineralization. In a capping which at first glance appeared to be so badly weathered that no sulphides remained, it was possible to detect, upon closer scrutiny, unmistakable veins of pyrite.

The manner of distribution of the ore minerals in the rock has an important practical bearing in the case of porphyry coppers. Where the ore minerals occur both in fractures and disseminated the deposit will be richer. This point was brought out by two assays, the first of which was from a portion of the orebody where the copper was associated with pyrite veins with little disseminated mineral while the second represented rock with disseminated copper and sulphides in closely set fractures. In the first instance the copper content was 1.2 per cent, and in the second 2.6 per cent.

A broad structural feature of a disseminated copper deposit which has resulted in what may be termed a "false gossan" is illustrated by the following: The ore consists of sooty chalcocite derived from chalcopyrite which is associated with pyrite in fractures and as disseminations in siliceous diorite. The ore-bearing rock occurs as a phase of a larger igneous mass and is capped by other igneous material of a more siliceous character. Before its alteration this capping contained primary pyrite and the formation carrying the ore was mineralized with both pyrite and chalcopyrite. Weathering changed the overlying rock to an iron-stained, more or less porous capping over the original ore-bearing formation and also aided in the enrichment of the latter by supplying sulphuric acid through the decomposition of pyrite in the overlying material.

In regions of intense erosion the zone of oxidation may overtake that of enrichment, with a resulting removal of ore. Where the slopes are steep and rainfall is abundant, the maximum degradation will be reached. Steep slopes and scant rainfall result in a lower level of ground water, which in turn establishes a deeper level for enriched ore.

An illustration of the principles involved in the case of enrichment was interestingly displayed in a small specimen about four inches square. The original rock contained pyrite, in some of which chalcopyrite was inclosed. Enrichment by sooty chalcocite had formed around the sulphides and in fractures through them. In the more altered portion, these minerals were completely removed and iron oxide had taken their place, filling the casts formerly occupied by the sulphides and staining the rock a reddish brown tint. This specimen of mineralized material was taken at a depth of 400 ft. below the surface.

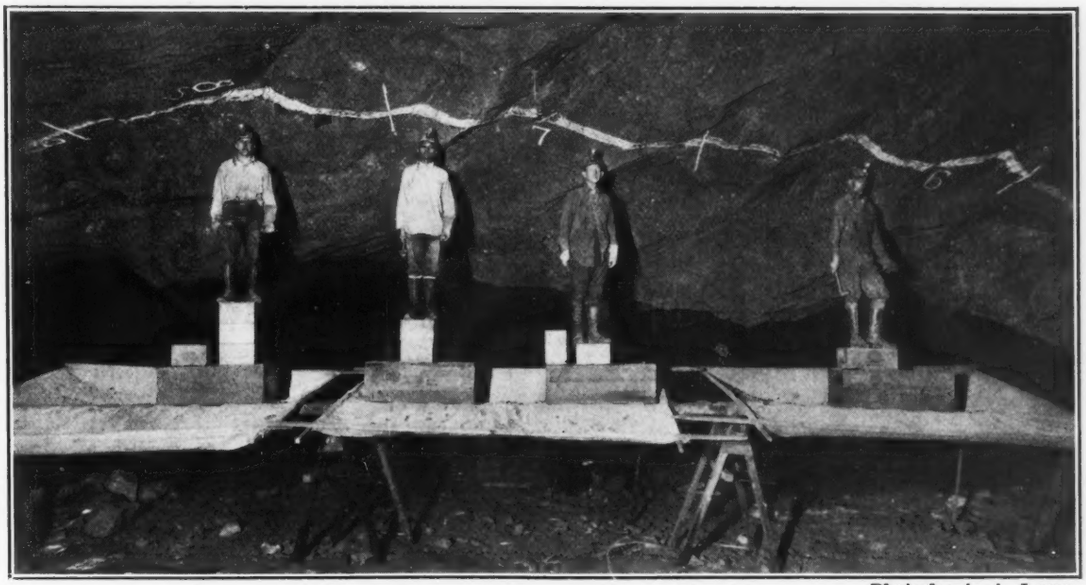


*Photo by A. A. Lease*

*Back sampling in the Homestake mine, Lead, S. D.*

Stopes are generally very wide, so that a cut across the back of a stope is a laborious proceeding. As shown in the photograph, the sample is divided into sections to furnish detailed information about the value of the ore.

# U. S. Bureau of Mines a Prolific Contributor to Technical Press and Scientific Societies*

By M. W. von Bernewitz†
U. S. Bureau of Mines, Pittsburgh Station

THE PURPOSE of every investigation made by the Bureau of Mines is a report of some kind—if results are of a confidential or negative character they are filed, but if of practical value to the public and engineering profession, they are published. Sometimes negative results are published to warn others that may contemplate similar work. As is well known, the reports of the Bureau come out as Bulletins, Technical Papers, Miners' Circulars, and Reports of Investigations; but the production of reports is considerably greater than the printing fund will meet, and as these reports or papers should be published promptly, they are sent, after due consideration of their contents, to either a current technical journal or to one of the scientific societies.

After considerable work, an index has been prepared for the first time of the original articles written by Bureau men and published directly in the technical press or by some scientific society. This covers a period of twelve years, and is to be published soon. Reprints or abstracts in other journals have not been included—only the journals to which the articles were sent and published. It was found that a total of 1,800 pages had been published by the various journals—that is, those of standard size, 9 by 12 inches—and a total of 4,000 pages by the societies, whose bound volumes are of standard size—namely, 6 by 9 inches. It should be added that several hundred of the latter pages include those published in the monthly journals of the societies—also 6 by 9 inches—and special chapters in several textbooks on engineering subjects. As the average technical journal contains about 40 pages, and the average volume of transactions about 800 pages, the Bureau has actually contributed 45 complete technical journals and 5 complete volumes of transactions to the engineering profession. These figures are approximate, but rather err on the side of moderation, because it is felt that after the lapse of so many years a number of articles have probably been overlooked. The figures indicate the great volume of output by the Bureau; and the output continues.

The subjects of the papers and articles include the following investigations: absorbents; acid mine waters; accidents of all kinds; alloys; aluminum; analyses and determinations of all kinds; apparatus development; ash; automobile exhaust gases; blast furnaces; boiler furnaces and scale formation; brass melting; carbon black; carbon monoxide; carbonization of coal; casting losses; change houses; charcoal, activation of and precipitation by; chloride volatilization; clays; coal of all kinds and safe and efficient mining thereof; coal ash; coal combustion; coal dust; coal fires; coke and its improvement for furnaces; combustion of fuels; concentration of ores; copper leaching; costs of all kinds; cracking petroleum; crucibles; cyanidation of gold and silver ores; distillation of petroleum and coal; drilling wells; dust explosions; dust in air, efficiency in fuels and mining; electric furnaces; electric motors; exhaust gases; explosions of dust and gas; explosives; ferroalloys; firebrick; first aid; flotation of ores; fuels; fumes; furnaces of all kinds; fusibility of various substances; gases of all kinds; gas masks; gasoline; glazes; graphite; helium; hygroscopicity of substances; inspection work; iron; kaolin; marketing minerals; lamps; lead; lignite; low-temperature distillation of coal; magnesia; manganese; melting; metals; metallography; metallurgy of ores and metals; microscopic studies of coal, ores, and metals; mine safety; miners; mining methods; natural gas; nitrogen; oil industry; oil shale; oil wells; ore dressing; oxygen-breathing apparatus; permissibles; physical chemistry; physiological effects on men; powdered coal; precipitation of dusts and precious metals; producer gas; pyrometry; quicksilver ores; radioactivity; radium; rare earths, gases, and metals; safety; sampling; smelting; solubilities of substances; sponge iron; steel; stoneware; storage of coal; spontaneous combustion of coal; sugar tube for dust sampling; sulphur dioxide; sulphur in coal and coke; talc; temperatures; trinitrotoluene (TNT); uranium ore; vapor phases and pressures; ventilation; volatilization; waste prevention; water problems; zinc, zirconium.

The principal beneficiaries, so to speak, of these original papers have been as follows, arranged alphabetically under (1) journals and (2) society transactions or proceedings:

**Journals**

*Brick and Clay Record*
*Chemical and Metallurgical Engineering*
*Chemical Engineer*
*Clay Worker*
*Coal Age*
*Coal Industry*
*Electrical World*
*Fireman's Herald*
*Foundry*
*Gas Age-Record (formerly Gas Age and Gas Record)*
*Iron Age*
*Journal of American Ceramic Society*
*Journal of Biological Chemistry*
*Journal of Industrial and Engineering Chemistry*
*Journal of Franklin Institute*
*Journal of Physical Chemistry*
*Journal of Society of Chemical Industry*
*Mining and Metallurgy*
*Mining and Scientific Press*
*Mining Congress Journal*
*National Engineer*
*National Petroleum News*
*National Safety News*
*Oil and Gas Journal*
*Oil and Gas News*
*Power*
*Safety Engineering*
*Science*
U. S. Public Health Reports

**Society Transactions or Proceedings**

American Ceramic Society
American Chemical Society
American Electrochemical Society
American Gas Association
American Institute of Mining Engineers
American Society for Testing Materials
American Society of Mechanical Engineers
American Mining Congress
American Society of Heating and Ventilating Engineers.
Coal Mining Institute of America
Coal Mine Inspectors' Institute of America
Engineers' Society of Western Pennsylvania
International Congress of Applied Chemistry (1912)
International Mining Congress (1915)
Western Society of Engineers

There has been no discrimination in the selection of publication mediums, but those above listed have been considered the best outlets for the particular papers prepared—that is to say, these journals and transactions or proceedings circulate among the technical men whom it is desired to reach; and the selection has proved to be satisfactory. That the general public may be informed also, abstracts or press notices of these articles are distributed widely; but many of them are too technical for the average reader, so the engineer is the man who benefits most, and, of course, ultimately the public through his practical application of the results obtained.

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†Pittsburgh Experiment Station, Pittsburgh, Pa.

# A Model Government for an Industrial Town

*At Bauxite, Ark., the Aluminum Company of America Cuts Production Costs by Keeping Workers Contented—No Poverty, Idleness, Nor Liquor, and No Jail*

**By Tom Shiras**
Special Correspondent, Mountain Home, Ark.

IF CLEAN well-paved streets, healthful amusements, modern well-built homes, pure water, good schools, and churches, absence of crime, and every possible method applied to maintain a high standard of health, are characteristics of a first-class mining town, Bauxite, Ark., is one of the best. At Bauxite are situated the mines and plant of the American Bauxite Co., a subsidiary of the Aluminum Company of America and the largest producer of aluminum ore in the world.

### Contented Workers a Big Asset

From the very beginning of its operations the company has never lost sight of the fact that satisfied labor is one of its biggest assets. The management keeps the plant at a high efficiency, but it does not forget that men are men, and that by housing them in real homes the company avoids a big labor turnover. The management does not lose sight of the fact that if employees are in poor health that condition reacts on the company's bank balance. It looks closely after the dividends, but at the same time it sees that the men and their families have plenty of healthful amusement. Clean surroundings make for clean bodies and clean minds. The citizens of Bauxite have reacted to this policy, and there is a town pride that is lacking in many mining communities. With all the labor troubles of the last few years, the Bauxite family of 3,000 citizens has moved peacefully along, with no labor difficulties.

Bauxite ore was discovered in Saline County in 1891. The orebodies now owned by the American Bauxite Co. were purchased in 1902. At that time aluminum was practically unknown as a metal, with few uses and little demand. The first year the company operated it produced 171 tons. The town of Bauxite then represented the proverbial acorn. Now, with its smooth streets paved with low-grade bauxite ore, its modern bungalows and cottages buried in bowers of flowers, its green lawns along well-groomed streets, it represents the full-grown oak. It produces 1,000 tons of ore per day.

### Water Supply Carefully Protected

Good water for domestic use is an important factor in maintaining a high standard of health in any community. The Bauxite water is drawn from deep wells. Although no contamination ever has been found in the water, it is analyzed weekly. The town has one of the best waterworks and sewerage systems in Arkansas, and almost perfect fire protection.

Besides the company buildings, which house the official and executive branches of the organization, there are 600 modern bungalows and cottages for employees and their families. These compose the sole citizenship of the town. These homes are rented to the employees at very modest rentals. Houses in Bauxite that would rent in larger places at from $15 to $20 a month, rent from $3 to $5. Others that would bring from $25 to $50, rent from $10 to $15.

The administration buildings of the company might be compared to a court house, or city hall in the regularly incorporated city. It is here that all council meetings are held and other phases of town government administered. Other public buildings in Bauxite consist of a modern hospital, operated and maintained by the company; three modern school buildings; a theater; two churches, and several chapels.

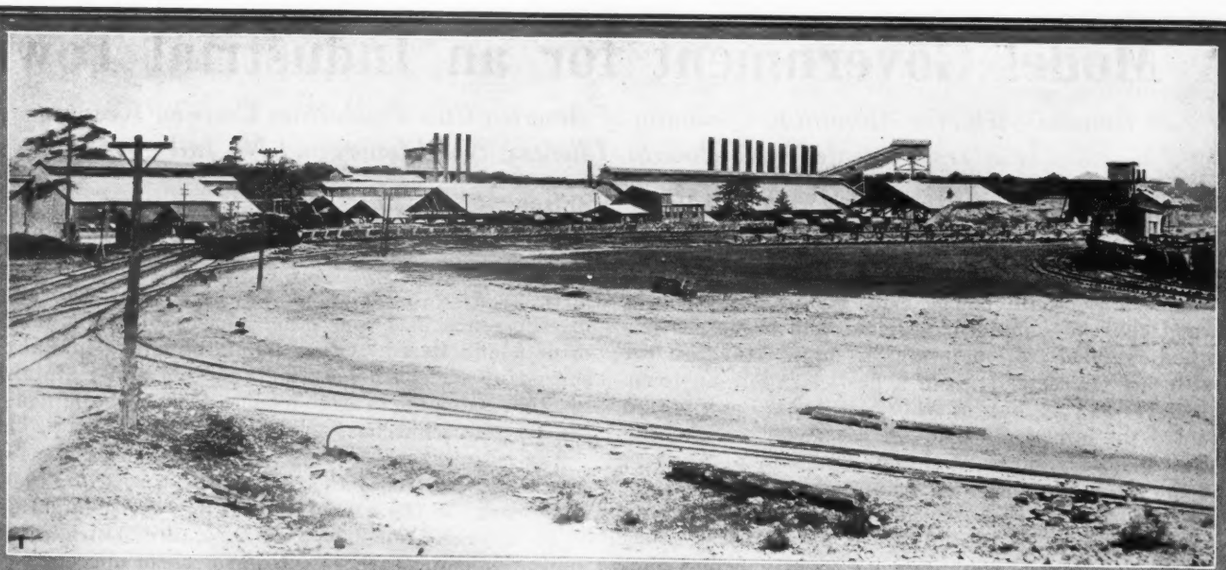
The main school building is a modern brick structure which was erected by the company at a cost of $10,000. It is leased to the school district for the nominal sum of $1 a year. The company also contributes several thousand dollars each year toward school upkeep.

The hospital is one of the most modern and completely equipped small hospitals in the state. Its location, at the edge of the business section, away from the noise and clamor of the streets, in a big shady park with a well-kept lawn, flanked by beautiful flower beds, in itself is soothing. A small charge is made for operations and medical attendance, but there is no case on record where anyone was ever turned away who needed assistance.

Bauxite has a well-equipped community theater. Citizens of the town get their entertainment here at cost. The best films are shown every week at an admission price of ten cents. The only expense attached to its operation is the light charge, film rental, and the wages of the operator. Door keepers and other attendants donate their services.

### Town Manager Co-operates With Elected Council

Town government is carried on much the same as in incorporated towns, except that the political thunder, the wrangling and the waste are absent. In conjunction with the town manager, who is appointed by the company, a council, consisting of twenty citizens from the five wards, constitutes the governing body. The town manager acts upon the advice of the council, and looks after all matters pertaining to the administration of town government, the upkeep and repairing of the houses and buildings, streets, lights, water, sewerage disposal, and mosquito control. Acting in close conjunction with the town manager is the director of the personal-relations department. He employs all labor, makes house and boarding house assignments, looks after the social welfare of the citizens, and is the chief "trouble shooter." A deputy sheriff, duly appointed by the sheriff of Saline County, acts in the capacity of chief of police. He is assisted in his work by the boy police force, which consists of twenty members, ranging in age from eight to fourteen. This force has the distinction of being the only one of its kind in the United States. These youngsters seem to have a nose for uncovering those things that lead to crime and jail. Since John T. Fuller, superintendent, organized this force, vandalism has ceased, and bootleggers are no longer a menace to the peace of the community. Besides reporting acts of vandalism, and the presence of suspicious characters, the boys' work covers the inspection of houses and reporting needed repairs to



1. *General view of the drying and calcining plants.*

2. *A good road, paved with low-grade bauxite.*

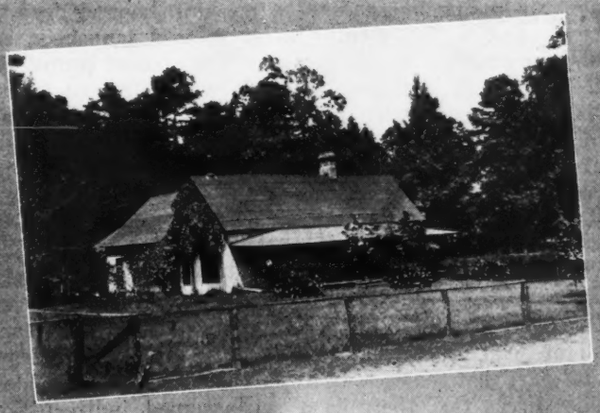
3. *The "movie" house, where good films are shown for a nominal admission.*

4. *One of Bauxite's churches.*

5. *The general office where drafting, chemical, clerical and industrial relations departments are housed.*

6. *The executive office.*

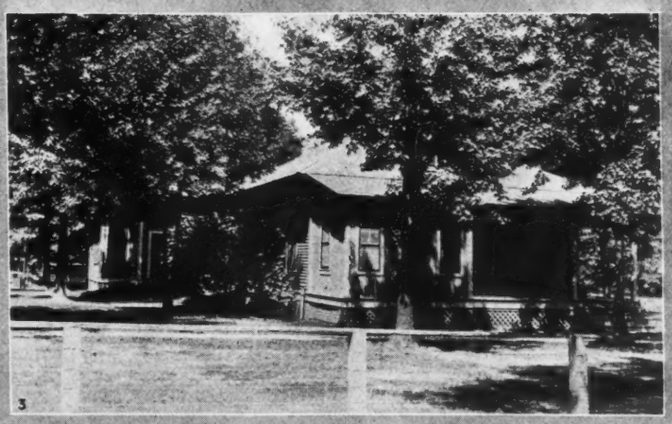
**Scenes at Bauxite, Ark., a model industrial town whose**



1, 2 *and* 3. *Typical homes of employees.*

4. *The club house for unmarried members of the staff.*

5. *Residence of the general superintendent, John T. Fuller, who is the power behind the throne in the town government.*



6. *A typical street. "Pensioners" form the street-cleaning department and take pride in keeping the town clean.*

7. *School building, erected by the company and leased to the town at a nominal rental.*

**residents are employees of the American Bauxite Co.**

buildings, streets, and to the water drainage system.

Bauxite has no jail, because it has never yet felt the need of one. The town government of Bauxite would rather prevent crime than punish it, and the officers work to that end. A careful survey of the causes leading up to crime shows that the foundation of nearly all crime is poverty, laziness, and hard liquor. These things are not tolerated in this town. Neither its citizens nor the company will stand for them. A man must work and provide for his family or move. A sot has no chance to become a member of the community at all, and because there is plenty of work for every man at a fair wage scale there is no poverty.

The departments that keep the town clean and healthy are the street-cleaning department and the department of mosquito control. The street-cleaning department is composed of employees who have grown old or decrepit in the service of the company. They keep everything shining—not spasmodically, but continually; and they take pride in the appearance of the town.

Malaria used to be a prevailing disease in Bauxite. At no time was the town free from it, and it was a real menace to health and operations. A few years ago the company organized a mosquito-control department, and a few months after it was launched the disease practically disappeared. The plan of control is to keep ponds and other stagnant water drained, or, if that is impracticable, the surface is kept covered with oil. The mosquito-control squad is on the job now about nine months in the year, and costs approximately $10,000 a year.

### Company Pays the Taxes

There is only one taxpayer in Bauxite—that is, only one that pays on real estate—and that is the American Bauxite Co. Its direct tax amounts to $25,000 a year, all of which reverts to the county and state except that part that comes back to the school district. Besides this direct tax, there is a self-assumed indirect tax which amounts to $40,000 a year. Several thousand dollars of the latter goes in making up the deficit in the yearly operation of the schools, and the balance to maintain the different departments of city government.

The company is not doing these things from altruistic motives; it believes that the plan, in the end, saves a great deal more than it costs.

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# Theory of "Pockets" and Nuggets

**By Robert Clarke**
Mining Engineer

THE ROUNDED SHAPE of gold nuggets has been generally attributed to the action of attrition during the passage of the gold from its source to the place where it is eventually found. This theory seems to me to be inadequate for the reason that gold in its original matrix is seldom found in pieces large enough to account for the size and shape of the larger nuggets.

I think that a more plausible explanation might be that the gold, liberated in ancient geologic times from its matrix, by the usual processes of erosion, was then, as now, concentrated in the gravels of streams, or on impervious layers of mud or clay, sufficiently dense to prevent its further settlement. These sediments were later consolidated into rock, and then intruded by eruptive rocks, either as dikes or sills. The eruptives would naturally follow the lines of least resistance, which would be either the bedding planes of the sedimentaries, or fissures caused by the drying and consequent contraction of the original mud, sand, and gravel. The gravel, being more porous, would form an easy path for the molten rock, and as most of the gold would be in this gravel, it would naturally be melted by the extreme heat of the penetrating rock, and would form prills and nodules, which would take the form of the space in which they lay. In the course of subsequent erosion, these would again be liberated, and would gravitate into the gravels of that particular geologic age. This process may have been repeated a number of times to account for some of the larger nuggets that have been found.

The objection may be raised that if this theory be correct nuggets should be found imbedded in the eruptives themselves. This has actually been the case in one instance within my knowledge, where a nugget weighing approximately 40 oz. was found at a depth of 60 ft. at Kanowna, West Australia, imbedded in one of the "ironstone" dikes, which in that country are almost invariably found in localities where much placer gold is found. A dike of this composition would probably be very liquid when erupted, and any gold encountered in its passage would readily sink into it, whereas some of the other eruptives would be more difficultly fusible, and would be too viscous, carrying the gravels on the top of the intrusive mass and simply melting the gold *in situ.*

Most of the placer gold in Coolgardie and Kalgoorlie, West Australia, was either coated with films of iron oxide, or had pieces of ironstone adhering to the nuggets, showing its close association with the dikes mentioned.

The "pockets" found in California and Oregon show the first stage of the action I have described, being the evidence of the original concentration of the gold after its liberation from its matrix. These pockets are usually found in clay or mud seams on the bedding planes of ancient sedimentary rocks, where they have been uptilted, thus forming natural riffles which have caught and concentrated the heavier materials resulting from the surface above them. Some of them have been already eroded and carried down into the present placer gravels, accounting for much of the placer gold which is not "water worn."

In some cases the material in the pockets contains loose crystals of quartz, but in others there is no quartz whatever, which goes to show that the gold is not in its place of origin as a metal, as I have only in one instance seen what was considered vein gold, not associated with quartz in some form. This is the occurrence of gold in the Pierre shales at the Aztec mine, Baldy, N. M. Here again the theory I have advanced may prove that the shales were only the original bed rock on which gold was deposited in ancient placers, and that the porphyry sills in the Aztec mine have been the agency of the heat which has melted the gold and caused it to run into the minute fissures in the shale, making it appear as if the shale itself were the original matrix of the gold. It is evident in this instance that the shales have been subjected to extreme heat wherever the gold is found, as it is invariably associated with amorphous graphite, no doubt the final product of the heat on the vegetal matter of the shales.

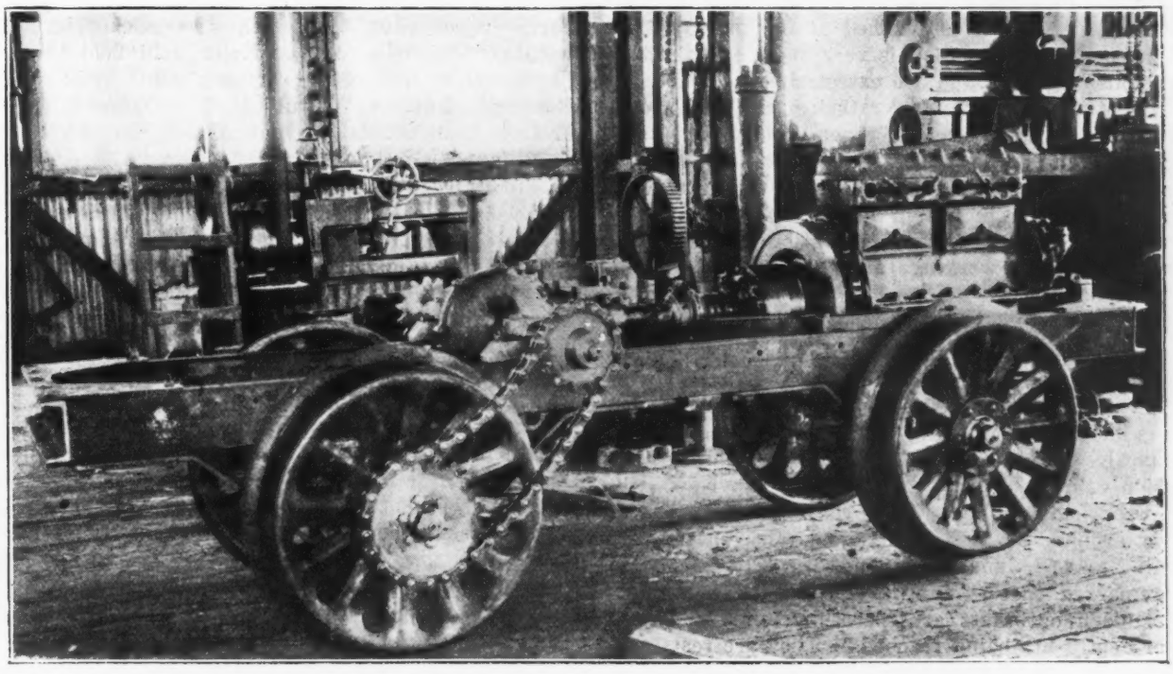
# USEFUL OPERATING IDEAS

## Gasoline Locomotives for Surface Haulage

BY GEORGE J. YOUNG

A simple form of gasoline locomotive constructed in the shops of the Calaveras Copper Co. at Copperopolis, Calif., is herewith illustrated. The locomotive was made by the mechanics employed on mine work during their slack time. It consists of a structural steel frame to which are attached two pairs of wheels. A Ford engine is used as the power unit and the rear wheels are driven by sprockets and chains.

The locomotive is used to haul copper concentrates from the mill bins to the smelting plant. It is especially useful for short transfers where there is insufficient material to justify the use of a belt conveyor. At the Idaho-Maryland mine, in Grass Valley, a gasoline locomotive of similar type was constructed and is in use for hauling ore between the pockets in the headframe and the mill bins.



*Gasoline locomotive constructed in the shops of the Calaveras Copper Co.*

## How to Figure the Cost of a Soot Blower

BY W. F. SCHAPHORST

Assuming that a soot blower for the boilers should pay 25 per cent on an investment, including interest, depreciation, and upkeep, the amount of money that can be spent for the blower can be figured as follows:

Take the average temperature of the chimney gas in Fahrenheit before installing the soot blower and from it subtract the temperature that the soot blower manufacturer proposes to give as an average after installing the blower. Multiply this difference by 457. Divide the result into the heat value per pound of the fuel that is being used. Then multiply by the boiler efficiency in per cent before installing the soot blower. Add one to the result. Then divide that into the number of tons of fuel burned per year and call the result *A*. Then multiply the number of boilers by 42 and call that *B*. Subtract *B* from *A*. Then multiply by the cost of fuel in dollars per ton, and, lastly, multiply that result by 4. The answer is the investment in dollars that can be made in soot blowers.

For example, if the annual fuel consumption in a given furnace is 10,000 tons of coal per year, heat value of coal 12,000 B.t.u. per lb., boiler efficiency before installations of the cleaner is 70 per cent, temperature before installing the blower 600 deg. F. and after installing an average of 550 deg. is promised (thus giving a temperature difference of 50 deg. F.), number of boilers is one, and the cost of the coal is $5 per ton, substitution in this formula will show that the boiler owner can afford to invest $4,460 in a blower for his plant.

In the above rule, it is assumed that 18 lb. of air is used per pound of coal as fired, that there are six blower elements in an average installation, that the boiler is cleaned four times per day, that the boiler is cleaned and operated 300 days per year, and that the average rate of evaporation is 6 lb. of steam for every pound of coal.

# Air-Blasts in Mines

By T. A. Rickard

THE MINES of the Kolar gold field, in India, continue to suffer from miniature earthquakes produced by the explosive fracturing of the rock in the deep workings. It is stated that recently two heavy "rock-bursts" between the 54th and 57th levels of the Champion Reef mine did much damage, and that these rock-bursts "are known to be due to the strain and tension in the rock itself," so that "they cannot be avoided." This group of four gold mines, with workings that have been extended from ancient diggings to a depth of over a mile, are particularly subject to accidents arising from the state of strain existing in the rock underground. Accidents are frequent; in 1911 one of them caused the death of twenty-one persons and injuries to thirty-five. The shock was powerful enough to shake down the plaster from buildings on the surface. On one level a tramcar was lifted four feet from the floor, indicating a strong vertical movement. A seismographic station established at the mines proves that the period of vibration is very short and that the oscillations of the ground are extremely rapid. During three months in 1911 no fewer than 5,092 local shocks were recorded, an average of over 55 per day. One inference is that the rocks in the locality are continually breaking, or snapping, because they are in a state of strain from which they are being gradually relieved by the underground excavations; another inference is that the workings are being excavated in a zone of faulting.

BEFORE GENERALIZING, let us see what other evidence is available to throw light on these interesting phenomena. In the Hillgrove district of New South Wales, the slate inclosing the gold-bearing quartz veins is known as a "kicking" rock, because it is subject to explosive rupture. In 1904 an unusually severe explosion of rock on the sixth level of the New Hillgrove Proprietary mine "affected the country for a mile or two around, as if an earthquake had occurred," according to J. B. Jaquet, the Chief Inspector of Mines, who remarked that "there is evidence to show that these sudden outbursts are increasing in violence as greater depths are being reached." They are restricted to a block of siliceous slate, which is hard and is traversed by numerous joints at all angles. When tapped with a hammer, the rock will break into many fragments, but the serious outbreaks occur when "a bridge of ground is being removed below a level"; that is, when a sudden release of pressure is caused. Fragments of rock are discharged with the velocity of a projectile. Here I may mention the fact that in the neighboring Sunlight mine such troubles are unknown, because the workings are in a slate of a more yielding character. On the other hand, the kerosene shale in the New Hartley mines, also in New South Wales, is so brittle that the miners are obliged to wear wire-gauze guards to protect their eyes from the pieces of rock that fly from the face of a working when touched by a pick. How deadly this eccentricity of nature can be to the miner is shown in a report by J. R. Godfrey, an inspector of mines, who instances several accidents in the Baker's Creek mine, also in the Hillgrove district. He says: "On one occasion two men were drilling in the face of the stope just above No. 11 level when a piece of the ground flew out and cut one of the eyes out of one man. On another occasion the whole of the floor of No. 9 level over one section of stopes split into thousands of fragments with a noise like breaking crockery, filling up the drive and nearly burying one of the underground bosses, while on the third occasion a large piece flew from the face of one of the stopes in No. 11 level and cut a man in halves." It is not surprising that such happenings should have suggested the explanation that the rock is in a state of molecular strain, like the so-called Prince Rupert's drops, which are made by suddenly cooling drops of molten glass. This explanation has been made apropos of the slickensided rock of the Derbyshire (England) lead mines, where a slight blow from a hammer suffices to cause the rock to fly to pieces, because, as suggested by Aubrey Strachan, it is in a state of strain in consequence of earth movements, to which the slickensides bear witness. Likewise, on the Kolar gold field the hornblende schist inclosing the quartz veins is believed by Bosworth Smith to be subject to a compressive force arising from crustal movement, whereas the strained condition of the quartz in the veins is believed to be due to the pressure of the walls consequent upon the removal of the ore over large areas. Here we touch the pith of the problem. Apparently two phenomena are involved in the enquiry, and they must be distinguished carefully. Mr. Jaquet sees the interplay of both causes; he says that "the bursts are due, firstly, to the walls being in a condition of strain; and, secondly, to the fact that the kicking ground will not bend; it only breaks, and, while breaking, disintegrates into a number of fragments. An ordinary slate under similar conditions of strain would probably slowly yield to the pressure and slowly swell into the level or stope. The 'kicking' slate offers a resistance to the pressure as long as possible, and eventually succumbs with a burst."

THE DEEP MINES of the world are subject to these air blasts or rock explosions, notably in the Lake Superior region and in the Witwatersrand district of South Africa. The Atlantic and the Quincy mines, on the Keweenaw peninsula of Michigan, have suffered much from small earthquakes arising from this cause. There it is hardly necessary to look for any special theory of a recondite character, because the extensive voids made by stoping lodes of remarkable regularity offer a ready explanation. The Quincy lode dips at 37 deg. and has been excavated on that flat dip for a depth of 8,000 ft. for a width of 8 to 20 ft., leaving an enormous roof in a state of strain due to the overhang of a great mass of rock. The pillars that are left to support the abandoned stopes become a source of danger because they prevent the settling of the ground gradually; instead, when eventually they do collapse, they cause a sudden release of pressure, which takes the form of vibrations that affect the surface like an earthquake, while underground the fall of the hanging wall compresses the air like a piston, so that it strikes violently against those who may be working even at a distance. The cessation of operations in the old Atlantic mine was due largely to the increasing incidence of such

air blasts. The longitudinal section of the mine tells the story: it was stoped for an almost uniform width of 15 ft. for a length of a mile and a depth of half a mile. The dip is 54 deg. It is no wonder that the weight of the overhanging rock gradually crushed the mine and created a series of juvenile earthquakes. F. W. Sperr, professor of mining in the Michigan College of Mines, has stated his belief that the bursting force is due to external, not to internal, conditions—that is, it does not arise from a natural state of strain of geologic origin but from the artificial instability created by the miners' excavations. When the pressure has become more than the pillar of rock in a stope can bear, and the moment of rupture has arrived, even the scratch of a pick will start a crash. When this happens the walls of the stope will vibrate and an earth tremor is transmitted to the surface. Where the rock will not stand the increasing pressure and the walls yield slowly, so as gradually to close the excavation made by mining, there are no air blasts or similar disturbances. This applies to conditions on the Rand, where sand—the discard from the mills—is used for filling the voids made by stoping. This practice has mitigated, but not stopped, the tremors or the caving that causes them. In these South African gold mines, as in the Lake Superior copper mines, the exploitation of unusually uniform lodes has caused enormous openings to be made at a great depth, down to a mile vertically, or a mile and a half on the dip. E. J. Moynihan stated the case as it exists at Johannesburg thus: "The mining companies have made a tunnel in the earth roughly speaking, thirty miles long and a few feet high. They have been widening this tunnel for over twenty years, until, on the average, it is something like a mile wide. The tunnel is also inclined in the direction of its width. Well, the roof is falling in. That is all." In other words, a large block of rock is left inadequately supported; at intervals the pressure accumulates so as to cause a sudden collapse; that means a fall of ground, a sudden concussion of air, and the passage of vibrations that perturb those resident on the adjoining surface. Tailing from the mills, as I have stated, is used for filling, but the compressibility of sand under pressure has been underestimated, so that the filling has proved less effective than was hoped. Therefore broken rock is now being substituted. In some of the mines "packs" of waste rock occupy 18 per cent of the ground stoped; these packs, or fills, permit the ground to settle slowly, and for that reason are preferable to pillars of unworked ground, which, as the pressure increases, eventually yield with a suddenness that is catastrophic.

IT REMAINS to record the accident in the Miami mine, in April, 1913, where a sudden cave caused the death of three men and serious injuries to seven others. The shrinkage-stope system of mining at the Miami requires the overlying cap, 250 to 300 ft. thick, to be undermined so that it will settle gradually, coming to rest on the broken ore underneath. The cap had been settling quietly, as anticipated, but, for some unforeseen reason, on April 13, 1913, it gave way suddenly, breaking through to the surface and bringing a weight of three million tons upon the block of ore intervening between the 245-ft. level and the shrinkage stopes underneath, so as to fill these stopes completely and expel the air in them with terrific violence. Men were hurled forty and fifty feet. Not a miner was injured by the rock itself, thanks to the systematic precautions in use; all the fatalities and injuries to the men were the direct consequence of the air blast itself. A train of fifteen cars and a seven-ton motor were blown 200 ft. along the track, despite the best efforts of the motor man. This gives some idea of the force generated by the squeezing of the air by the falling rock.

In conclusion, it is evident that the air blast underground, or its counterpart the earth tremor on the surface, is a logical consequence of large-scale mining operations on lodes or veins having such a dip as to bring the weight of an ever-increasing mass of rock upon the hanging wall. The outburst caused by a state of molecular strain in rocks under excessive pressure due to a geologic condition is like that engendered by the excavations of extensive stopes along a flatly dipping vein except that for the natural geologic condition man is not responsible, whereas for the artificial result of his own digging he is directly responsible, and therefore is in a measure able to mitigate if he adopts proper methods of filling the voids that cause the trouble. In other words, the problem is one of systematic mining.

*Photo W. Lee Heidenreich*

*Prospector's cabin in the Chuchua district, British Columbia*

# DISCUSSION

## Platinum Fakers

THE EDITOR:

Sir—From time to time there appear in the columns of the *Journal-Press*, articles reporting the alleged finding of platinum in commercial amounts in certain districts of the western states. Without exception the platinum is in an unusual form and cannot be detected by the established methods of analysis.

In a recent issue are reported the findings of a commission appointed to investigate the reported occurrence of platinum metals in Idaho. In connection with this report the name of Mr. Dozier, of Grant's Pass, Ore., is mentioned.

As I have had the privilege of investigating the "secret" methods of platinum analysis used by three different "chemists," including Mr. Dozier, it is my belief that a disclosure of their procedure may be of general interest.

In 1918, while engaged in customs work with the firm of Glover, Wells & Elmendorf, Seattle, I had occasion to assay upward of twenty-five samples from the Nelson mining district, British Columbia. In none of these did we find platinum. A chemist in Philadelphia reported considerable platinum in duplicate samples. Arrangements were made for him to come to Seattle and demonstrate his method, which was essentially as follows:

A sample consisting of several assay tons is crushed to one-quarter inch, placed in a muffle and roasted to eliminate volatile elements such as sulphur, antimony, and arsenic, and, when withdrawn, plunged hot into cold water to render disintegration of the ore complete and thus insure complete liberation of the platinum on subsequent grinding. The roasted pulp, after being ground to 100 mesh, is digested hot with hydrochloric acid, and all soluble salts are filtered off. The residue from these operations containing the platinum is then digested in lead containers with hydrofluoric acid to eliminate silica. The final residue containing the platinum is then fused with the ordinary fluxes used in fire assaying and the resultant lead button cupelled. The silver in the bead resulting from cupellation is preferably volatilized in an oxy-hydrogen flame, although chemical methods of separation are permissible.

The gentleman referred to above was unable to demonstrate the presence of platinum in a single instance in the ore in which he had previously reported commercial amounts, although he did find some palladium in a sample of concrete immediately following a sample of palladium concentrate.

In 1921 I had occasion to visit Grant's Pass, Ore., and investigate the methods being used by Johnson Bros. and Mr. Dozier.

Following is the method used by Johnson Bros.: One assay ton of pulp is fused as in the ordinary fire assay. About 50 mg. of silver is added before cupellation, which is conducted at a relatively low temperature. The resultant bead is parted with concentrated sulphuric acid, and care is taken that the acid does not boil, in which event, it is claimed, the platinum would dissolve with the silver and thus be overlooked. The parting is allowed to continue until judged complete. The residue is washed, dried, and weighed as platinum. If there is any doubt about the residue being platinum, it is dissolved in aqua regia and tested with a solution of potassium iodide, which gives with platinum salts a pink to reddish solution, depending on the strength.

The residue from six different assays was tested by me and found to be, as suspected, silver with a trace of gold. The test with potassium iodide as conducted by Johnson Bros. is entirely misleading, as they neglect to rid their solutions of nitric acid and the coloration is produced by the liberation of iodine. If the reaction is not clearly defined, concentrated sulphuric acid is added, which liberates an abundance of iodine, which settles to the bottom in the form of "sponge platinum."

Mr. Dozier's establishment was next visited and his method of platinum analysis ascertained. Owing to the fact that the platinum in the samples which Mr. Dozier assays occurs, according to him, as minute particles of platinum arsenide, sperrylite, it is imperative that the ore receive a preliminary roast to drive off the arsenic and thus prevent the subsequent volatilization of the platinum. The roasting is effected by placing the pulp in a short iron nipple capped on each end and introducing the whole into a wood fire, where it is left at a red heat for about twenty minutes. The arsenic escapes through the pores of the metal, filtered as it were, while the platinum is obedient and stays behind. After this operation the residue is treated with aqua regia and, when decomposition is complete, is filtered. The residue is discarded, while a saturated solution of ammonium chloride is added to the filtrate. Barring faulty technique, it would now seem quite proper to filter off the ammonium platinum chloride, but no; the whole filtrate, with its acid-soluble salts, including soluble silica, ammonium chloride, and what not, is evaporated to dryness. The residue from this operation is scraped into another nipple, or "gun," as Mr. Dozier calls it, and packed down firmly with liberal amounts of scrap paper rammed home with an iron bolt and hammer. The threads on the nipple are treated with moistened soapstone and the caps tightened with a wrench. The "gun" goes into the fire, where it remains at a red heat for about twenty minutes. It is then removed and the contents are dumped into a gold pan. Any hard lumps are scoured and broken up with a whetstone. After panning off the waste carbon and like matter the residue is dried and further cleaned by picking out the waste with any convenient article, such as a pencil or penholder. The flakes of "platinum" and "platinum sponge" are then weighed and reported. Mr. Dozier is able to distinguish between the metals of the platinum group and separates them into piles with the aforementioned pencil. Literally, a pencil assay.

The material which Mr. Dozier obtains consists of

particles of carbon, which he calls sponge platinum, pieces of metallic iron, silicon and some other substances, as well as a metallic alloy reduced from the salts present by the carbon in the paper in conjunction with heat and pressure. Several pieces of this alloy were tested for platinum, with negative results. There were indications also that some carbon was converted into graphite.

Mr. Dozier's process is evidently a crude attempt to duplicate a method used more than a century ago to convert platinum sponge to metal. The sponge was obtained by treatment of crude placer platinum.

Mr. Dozier does not claim to have had the benefit of a technical training and, in fact, refers to himself as just a plain old clodhopper, which latter statement was allowed to pass unchallenged.

We have here three different methods by three different assayers, all purporting to find platinum where none is present. This one detects platinum in a colloidal form; a second takes advantage of the faulty technique of the commercial assayer; a third heats the pulp to prevent volatilization of the platinum.

When one considers the hundreds of thousands of dollars being thrown away in useless work when they might be diverted to more remunerative channels, this matter of unreliable assaying becomes a problem.

Ketchikan, Alaska. A. L. HOWARD.

## Licensing of Promoters

THE EDITOR:

Sir—In the Oct. 15 issue of the *Arizona Mining Journal* there is an outline of the revision by the last Legislature of Arizona of the law pertaining to the registration of engineers, architects, and assayers. The revision provides that it is unlawful for any one to practice one of these professions or vocations in a responsible capacity after Jan. 1, 1924, unless registered by the state, or unless registration has been applied for. Penalties range from $100 to $500 in fines, and, at the court's discretion, include imprisonment. Government officials are exempted, although I do not understand wherein lies the logic. The statute covers state employees and people who make or offer to make examinations for the public, and who prepare or offer to prepare reports bearing on the probable economic worth of deposits or reputed deposits of metallic or non-metallic minerals, rocks, coal, asphalt, petroleum, oil shale, or natural gas. This step has been taken with the end in view of eliminating pseudo mining engineers who are utterly incompetent or dishonest and who constitute a serious menace to the mining industry. The statement is made that the enactment was not to create a monopoly for a limited few, but to protect the public from the operations of incompetent and unreliable men. I am informed that if the public can be protected through the registration of competent engineers the board will feel that its labors have been more than justified.

Now, I am heartily in accord with any movement that will eliminate the unscrupulous element in the engineering profession, but I am not wholly convinced that registration will purge an engineer of all traces of dishonesty, if he be so inclined, or that registration will preclude the "quick" methods used by some competent though time-harassed assayers. Any reasonably intelligent man with a few years' experience, or a college graduate with little or no experience, which is worse, can pass the examination. The law does not consider the unscrupulous from whom we have no adequate means of defence, but merely discriminates against the utterly incompetent, from whom the now overly cautious public needs no protection, as the word and deed of the incompetent usually brings on his own downfall before he has seriously injured the public. Contrast this with the oily, although equally incompetent, or, if competent, still oily, mine promoter that yearly mulcts the public through unscrupulous dealings. Why not make compulsory the registration of this class of men if the sole purpose of the act is to the end of protecting the public? An incompetent or unscrupulous promoter may organize an incorporation to develop a property that has been reported unfavorable by a registered engineer. He can elect himself manager of the organization, and, if versatile, can sell the public a few thousand shares, and proceed to expend the money as it may suit his pleasure. What is to prevent the expending of 80 per cent of each dollar to float a $30,000 stock issue, or prevent the expenditure of shareholders' money in laying out and beautifying a townsite at a property where at best only a few miners, mostly Mexicans, would be employed, provided there was any money left to develop the property to proven merit? What is to prevent anything incompetent or unscrupulous at the hands of the promotor? The Corporation Commissions have not prevented it; other of our numerous enactments have not prevented it; neither will the registration of engineers, architects, and assayers. If the mining engineers are beclouded with a shroud of unscrupulousness and they can be baptized through registration, and purged of their sins, would there not be a smattering of logic in extending the courtesy to the brotherhood that make or break most of the promoted mining properties?

The situation will doubtless tend to create a certain monopoly for a few, and will literally place an import duty and inconvenience on the professional services of engineers having national repute who find it necessary to enter the state occasionally. It will not materially protect the public from being flim-flammed by the unscrupulous element, but, on the contrary, will give only an appearance of security that will make infinitely more easy the operations of the shady promoter. The utterly incompetent mining engineer, too, can always turn promoter, whereas if he was permitted to stay in the engineering phase of mining he would turn one down occasionally in order to keep up the average.

Phoenix, Ariz. E. W. BEDFORD.

## The American Association of Engineers

THE EDITOR:

Sir—On page 727 of the Oct. 27 issue of *Engineering and Mining Journal-Press*, T. A. Rickard speaks about the American Association of Engineers in a generalization meaningless in the looseness of its terms and misleads and belittles the intelligence of the readers. It is a curious thing that an erroneous statement of this sort can find place in such a reputable journal.

Mr. Rickard said:

"Apparently the inevitable has to be faced: the acceptance of the trade-union idea. This has been adopted frankly by the American Association of Engineers, which now claims the largest membership among organizations of this character within the engineering occupation."

The American Association of Engineers in the annual convention at St. Louis in 1920 adopted unanimously a

resolution "that the advocacy by any member of A. A. E. of strikes or other questionable methods commonly employed by labor unions to secure their ends shall be considered a sufficient ground for his expulsion."

The same convention adopted without qualification or reservation, and unanimously, the following statement of directors and officers of the association, which was issued and given wide publicity in November, 1919:

"Economic Position of the Engineer. The engineer is the medium through which both capital and labor are used in production and in industrial development. The aim of the profession is to advance civilization and render the highest service to society. Except when their acts further this aim, it is an advocate of neither capital nor labor.

"Increased Production. Production should be increased, not limited. The profession cannot support strikes or lockouts or any other methods that may benefit any class at the expense of the nation as a whole. They are unsound and must inevitably lead to economic disaster. The law of supply and demand for men or material must ultimately prevail. Attempts may be made to limit the supply of either, but looking toward the upbuilding of civilization we believe rather in increasing the demand through the promotion of legitimate enterprises.

"Reward According to Merits. Rewards should be according to ability, initiative and constructive effort. Men are not equal in these respects. Each man should be encouraged to do his utmost and be given compensation according to ability and will to increase production and to achieve large results.

"Method. The engineer, as an educated professional man, believes in basing his claims for proper and just reward for his services upon the justice of the facts presented, upon enlightenment of public opinion, upon loyalty between employer and employee, and upon the underlying fundamental desire of the great majority to do what is fair and right when the merits of the case in question are clearly presented and demonstrated. We believe in organized representation for the correction of wrong, the advancement of the profession and service to the public, but are opposed to methods inconsistent with the dignity of the profession and which would lessen public confidence.

"Conclusion. The American Association of Engineers, through the members of its board of directors who have signed this statement, recognizing the many fundamental differences between the principles and objectives of the trade union and of an organization of professional men, expresses the opinion that an engineer cannot subscribe to the tenets of both."

Mr. Rickard's obvious unfamiliarity with history and facts is further illustrated by an inferred ignorance of the leaders in the American Association of Engineers. Among the presidents of recent years were: W. H. Finley, president of the Chicago & Northwestern Railroad; F. H. Newell, formerly director of the U. S. Reclamation Service and now consulting engineer of the Pennsylvania Giant Power Survey; L. K. Sherman, formerly president of the U. S. Housing Corporation and now in consulting practice in Chicago; and A. N. Johnson, formerly State Engineer of Illinois and now dean of engineering of the University of Maryland. Would anyone believe for a moment that these men were possessed of trade-union tendencies?

Having stated what the American Association of Engineers is not, it might be well to say in a few words what it is. Its objects, according to the constitution, are to promote the social and economic welfare of the engineer and to stimulate and encourage public service in the engineering profession. It is an all-inclusive association based on the rights and responsibilities of individuals, the solution of problems coming to all engineers. It advocates unity of the profession. In the words of W. H. Finley, "The American Association of Engineers has proven its value to engineers and the public, because it has made the public realize the greater value of the profession in modern life and has led the engineer to see and enter larger spheres of service in it."

Briefly the purposes may be stated as follows:

1. Raise the plane of engineering practice.
2. Build engineers into better citizens.
3. Study and participate in state and local public affairs.
4. Promote appointment of responsible engineers for positions for which their education and records qualify them.
5. Render a national employment service.
6. Protect engineers from discrimination and unjust practices.
7. Advocate salaries for the engineer on merit and commensurate with responsibilities.

This repetition of simple facts could be very considerably extended, but we trust has accomplished its purpose in laying the ghost of misinformation that is occasionally paraded.

C. E. DRAYER.

Chicago, Ill.

## A "Jem" From Cornwall

THE EDITOR:

Sir—The accompanying quaintly worded letter was sent by a real Cousin Jack in Cornwall to a friend of mine who owns the gold mine. Fictitious names have been substituted throughout. The sporting proposition is quite in keeping with the traditional spirit of the early Cornish miner, and the peroration, "Now Sir Dont lets Bouth Die and Leave this Jem uncovered is My Advice to You," is fine and might well be heeded.

S. H. BROCKUNIER.

John Hampton
Higher Lower Road
Somewhere in Cornwall, England

To Mr. Kenneth Cochran;
Dear Sir:

Your letter dated ———, 1923, came to me in due Course but I am so undecided wat to do about comeing to America at my time of life that I done know wat more to say to you, all I can say now is I know ware the gold is in your mines and would like to be their myself to uncover it Befor your Eyes and see you smile. I think their is millions of dollars theire. I lifted the covers and looked at it and closed it down again Because Mr. Cleghorn had me once and I would not trust him again. (Mr. Cleghorn was the mine superintendent—S.H.B.) Now I have my plans made to show you the best mine you have ever seen, inside of six months, if you say something. You say I have my novil way of Doing Business, well wat am I to Doo, I say you must first take 100,000 Dol out of the mine wen this is Done, you Pay Me 25,000 Ditto, then wen you will agree to Do this Your Attorney in America and my Loyer in this country I will send my man or come myself and show you ware to tap the gold, you Have nothing to Loose and all to gain, for if I show you nothing you have nothing to Pay, and then untill the Mine Produces One Hundred Thousand Dolars You Have Nothing to Pay. Now Sir Dont lets Bouth Die and Leave this Jem uncovered is My Advice to You.

I Remain Yours Truly

John Hampton

P.S. Mr. Cochran My Soninlaw as Fixed this in His Fine Form, but I am not sending it for it is the Gold you want and not fine Words. Now sir I think you can Read from this I can Do Nothing with Theory But Practical Knowledge is Wats Wanted at the Happy Thought Mine.

# CONSULTATION

## A Zinc Marketing Problem

"We are having considerable difficulty in selling our zinc concentrates. We have been shipping to a smelter in the State of Oklahoma. They are paying us 80 per cent of the zinc contents and charging us a minimum of $20.50 treatment charge. We pay over $9 freight, our ore averages 44 per cent zinc, and there are no penalties in connection with our zinc concentrates. It is not a flotation concentrate, but a dry granular product easily handled, and no expense is necessary in drying.

"We have not had much experience in selling zinc concentrates. The above-mentioned contract with the company is based on 6c. zinc, and we take the average London quotation for settlement. At the best we receive only $8.60 per ton for this product, and out of this $8.60 per ton we have to pay the Mexican export duties; and as we are situated four miles from the railroad, we are under heavy expense in getting these concentrates on board the cars.

"On one car of zinc containing 42 per cent we received only $1.70 per ton from the zinc company. Now, then, I would like to have you give me a line on what is the usual treatment charge for the various zinc smelters in the United States for a concentrate of this kind. It seems a shame that we are being treated this way, and anything that you could do for us we shall greatly appreciate. I also wish to add that if zinc goes up we have to pay up to $26 per ton treatment charge."

The zinc-smelting charges in ore contracts which the smelters make with shippers are nearly always nominal and represent approximately what it costs the smelter to treat the concentrates. The charges vary with the grade of the ore; the higher the grade the greater the charge. In the last analysis a smelter will pay only enough for a lot of ore to leave a profit for it in the smelting. It will so arrange its contract that that object is achieved. The smelting charge may be placed at a low figure, the subnormal difference being made up by an increased or extra penalty. Then, again, penalties may be light and smelting charges heavy.

In the case in question, the smelting charge does not seem excessive. It is common for smelting companies with the present Joplin ore market to figure their smelting costs at $21 per ton, a cost which they have frequently maintained makes prohibitive the handling of more than $40 ore in a 6.50c. slab zinc market. They reason as follows: $40 plus $3 (cost of transfer to smelter) plus $21 squals $64. From each ton of average 60 per cent concentrates the smelter recovers, say, 1,000 lb., for which in a 6.50c. St. Louis slab zinc market it obtains $65, less the difference in freight from smelter to East St. Louis. Hence it can be seen that on the basis shown the profit to the smelter is not large. It may cost less than $20 to smelt a ton of concentrate. We have no actual cost calculations and can only rely upon trade information.

It would appear that the grade of concentrate being shipped in this case is too low to withstand a heavy freight rate. The standard Joplin zinc concentrates run 60 per cent metallic zinc. Would it not pay to bring up the grade from 44 per cent to a higher ratio? Under the conditions as stated over half the material shipped is worthless, and is carrying as heavy a freight rate as the valuable content.

The zinc-smelting business is more highly competitive than that of other metals, owing to the fact that most of the smelters are dependent upon sources of supply outside of their own organization. Very few zinc producing companies can depend principally from ores derived from their own mines. Most of them participate in the Joplin or other ore market. Hence a mining company that is dissatisfied with the treatment accorded it in a contract has the privilege of entering into other negotiations with a view to making more satisfactory arrangements elsewhere.

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## Mines of the Pre-Cambrian

"Will you kindly, through the columns of the *Journal-Press*, give me data relative to the mines which are located in the so-called pre-Cambrian formation?

"I note there has been considerable talk recently of the Ontario Gold Mines and their existence in this formation, and I further understand that the St. John del Rey, of Brazil, is in this same formation, and I am wondering if there are any others throughout the world.

"Will you also give me the depths of the various mines in this formation, and, further, will you give me an idea of whether or not mines of this type increase in value as depth is attained?

"What is the inclosing formation of the copper mines of the Lake Superior district?

"Is the formation in the Lake of the Woods and Kenora section of Ontario similar, in any way, to the formations in which the mines of northeastern Ontario are found, and, further, is there any similarity between the formations in the Rice Lake, Manitoba, district and the northeastern Ontario section?

"Can you give me any authorities in connection with the possible depths to be expected in the Porcupine and Kirkland Lake areas?

"This information will be greatly appreciated."

Many mines of all kinds in different parts of the world are located in the pre-Cambrian formations. This applies not only to Canada but to some of the rich copper deposits of Arizona, and indeed to mines in other parts of the world. Veins and other ore deposits in the pre-Cambrian formations have very much the same characteristics as to value and depth as veins in other formations. Some of the veins have not been worked very deep before they have become unworkable, and therefore have been abandoned. On the other hand, some of the ore deposits have been worked down thousands of feet without yet finding the bottom. What the ultimate depth of some of these deposits will be has not yet been demonstrated, and this applies to the Porcupine and Kirkland Lake areas. Of course, in the Porcupine district a very considerable depth has already been reached, while in the Kirkland Lake district mining has not yet gone so far down. The copper mines of the Lake Superior district are in the so-called Keewenawan formation, which is a division of the pre-Cambrian.

# SOCIETIES, ADDRESSES, AND REPORTS

## Senator Oddie Wants Suggestions on His Department of Mines Bill

### Measure Provides for a Secretary of Mines—Bureau of Mines and Geological Survey to Form Nucleus—Economic Investigations Mentioned

SENATOR TASKER L. ODDIE, of Nevada, has completed the draft of his bill proposing the establishment of a Department of Mines, as a subdivision of the administrative branch of the Federal Government. The draft of the bill has been submitted, for criticism and suggestions, to the following persons: E. P. Mathewson, president of the American Institute of Mining and Metallurgical Engineers; Allen H. Rogers, president Mining and Metallurgical Society of America; James F. Callbreath, Secretary of the American Mining Congress; Dr. H. Foster Bain, director of the U. S. Bureau of Mines; Dr. George Otis Smith, director U. S. Geological Survey, and J. E. Spurr, Editor *Engineering and Mining Journal-Press*. The text of the bill in part follows:

**A BILL to Establish a Department of Mines and for Other Purposes**

Be it enacted by the Senate and the House of Representatives of the United States of America in Congress assembled. That, for the purpose of fostering, promoting, and developing mining, the mining industry, and the mineral resources of the continental United States and its noncontiguous territory and possessions, there is hereby established at the seat of Government a Department of Mines, whose province and duty it shall be to collect, through scientific and economic investigation and research, comprehensive and useful information on mining, the mining industry, the mineral resources of the continental United States, and its noncontiguous territory and possessions, and on the domestic and foreign marketing of minerals and mineral products, and to distribute and disseminate the information so acquired.

Sec. 2. That the term "Federal agency" used in this Act shall be construed to mean and include any institution, bureau, board, commission, division, unit, or other form of organization within the executive branch of the Government of the United States, except that of an Executive Department.

Sec. 3. That section 158 of the Revised Statutes of the United States including all amendments thereto, is hereby made applicable to the Department of Mines, and the provisions of title 4 thereof, as amended, shall apply to said Department.

* * *

Sec. 5. That there shall be at the head of said Department a Secretary of Mines, to be appointed by the President, by and with the advice and consent of the Senate, who shall be its Chief Executive Officer, and whose salary and tenure of office shall be like that of the heads of other Executive Departments of the Government of the United States. There shall also be in said Department an Assistant Secretary of Mines, to be appointed by the President, who shall receive a salary of $5,000 per annum.

* * *

Sec. 7. That all the powers, duties, and functions which at the time this Act becomes effective are exercised by or conferred or imposed upon any head of an Executive Department or other Government Establishment in or over the administration of any Federal agency which by this Act, or otherwise, shall be transferred to the Department of Mines, or in or over any business arising from or pertaining to the exercise of the powers or the performance of the duties conferred or imposed by law upon said Federal agency, or in relation to the custody, care, or control of the records and property thereof, shall be vested in, exercised, and performed by the Secretary of Mines.

Sec. 8. That the Secretary of Mines is authorized, with the approval of the President, to assign all or any part of the powers, duties, and functions transferred by this Act, or otherwise, to one or more of the bureaus or divisions of said Department of Mines; to reorganize, consolidate, or abolish any Federal agency so transferred; and to create such new bureaus, divisions, and units in said Department as may be necessary.

Sec. 9. That the President is hereby authorized to transfer to the Department of Mines any service or activity performed or conducted by any other Department, establishment, or agency of the Federal Government which he shall find to be related to or connected with the powers, duties, and functions hereby vested in the Department or Secretary of Mines. The President's order directing such transfer shall designate the records, equipment, property, personal, and available balances of appropriations to be transferred. The President may, upon request of said Secretary, direct the transfer to said Department of originals or duplicates of other records in any Executive Department, establishment, or agency of the Federal Government.

Sec. 10. That all records and papers belonging and pertaining exclusively to the business of any Federal agency by this Act transferred, or otherwise, to the Department of Mines, and all furniture, equipment, and other property belonging to the United States in use in, or in the care or custody of, such Federal agency shall be transferred to said Department.

Sec. 11. That all orders, rules, regulations, permits, or privileges issued or granted by any officer of any Executive Department, establishment, or agency of the Federal Government in or in connection with the administration of any power, duty, or function which under the provisions of this Act, or otherwise, shall be transferred to the Department of Mines, shall be deemed to be in full force and effect until modified, superseded, or repealed by said Department, so far as they are not in conflict with the provisions of this Act; Provided, however, That the provisions of this section shall not affect pending legal cases or proceedings brought by or against any Federal agency hereby, or otherwise transferred to said Department, but shall be continued by and brought to final determination through the Executive Department, establishment, or agency from which said Federal agency shall have been transferred.

* * *

Sec. 13. That all officers and employees under the control and jurisdiction of, or employed in or by, any Federal agency by this Act, or otherwise, transferred to the Department of Mines, shall enter said Department at the respective grades and salaries held and drawn by said officers and employees on the date of such transfer.

Sec. 14. That all unexpended balances of appropriations, including continuing, specific, or indefinite appropriations, available upon the passage of this Act for use in the administration of any Federal agency transferred to the Department of Mines under the provisions of this Act, or otherwise, shall be and remain available for expenditure for such Federal agency by said Department.

Sec. 15. That the United States Geological Survey and the United States Bureau of Mines are hereby transferred to and placed under the exclusive jurisdiction, supervision, and control of the Department of Mines.

Sec. 16. That the Secretary of Mines shall have charge of all buildings, premises, and other property, however acquired, belonging to or used in connection with the Department of Mines. Until adequate quarters are provided, said Department shall occupy the buildings and premises now occupied by the Federal agencies which are by this Act, or otherwise, transferred to said Department.

* * *

Sec. 18. That the Secretary of Mines shall annually report to Congress for the preceding fiscal year on all moneys officially received and disbursed by him for and on behalf of the Department of

Mines, on the work done by said Department in fostering, promoting, and developing mining, the mining industry, and the mineral resources of the continental United States and its noncontiguous territory and possessions, and shall make such recommendations as he may deem necessary. He may also from time to time make such special investigations and reports as he shall deem necessary.

Sec. 19. That there is hereby appropriated out of any money in the Treasury not otherwise appropriated the sum of $50,000, to be disbursed under the direction of the Secretary of Mines for the purpose of carrying out the provisions of this Act, which sum shall be available for obligations incurred prior to July 1, 1925.

## Oil Problems To Be Discussed by Petroleum Institute

The American Petroleum Institute has announced the preliminary program for its fourth annual meeting to be held at the Statler Hotel, St. Louis, Mo., Dec. 11, 12 and 13, 1923. Among the speakers will be Thomas A. O'Donnell, president of the Institute; Henry L. Doherty, president of Henry L. Doherty & Co.; Paul Shoup, president, Pacific Oil Co.; Edward Prizer, president, Vacuum Oil Co.; A. C. Bedford, chairman of the board, Standard Oil Co. (New Jersey); George N. Moore, president, Western Petroleum Refiners' Association, and E. W. Marland, president, Marland Oil Co.

Some of the important subjects to be discussed by speakers are the oil industry and the public, European conditions, problems of the oil producer and the oil refiner, and the industrial, marine and home use of fuel oil.

Special group meetings will be held covering pipe-line, ship, and tank-car transportation; the utilization of petroleum and its products, the automotive fuel problem and the standardization, simplification and improvement of oil-drilling methods and equipment.

## Mine Rescue Maneuvers Held in Globe-Miami District

The Globe-Miami Mine Rescue Association, an organization that is maintained by all the companies operating in the Globe-Miami district in Arizona, has just completed the regular mine rescue maneuvers which are held semi-annually. The program included helmet and rescue practice at an abandoned section of the Old Dominion mine, and such work as would be necessary in case of a conflagration. Dummies and live men were rescued from the gas- and smoke-filled workings, the teams penetrating over three thousand ft. of drifts and about 150 ft. of raise to reach the "victims." F. C. Gregory, mining engineer of the Bureau of Mines, attended the maneuvers and assisted in the training. Mr. Gregory, like many others that have visited the district, has expressed the opinion that there is no place where better training is afforded and where the rescue work is more efficiently maintained.

# Zinc Institute to Ascertain American Standards for Galvanized (Zinc-coated) Ware

### Midyear Meeting at Picher, Okla., Takes Important Step for Betterment of Entire Industry—Assures Fullest Co-operation

AT THE recent meeting in Picher, Okla., the board of directors of the American Zinc Institute voted to ascertain the standards for the galvanizing (zinc coating) of iron and steel by American manufacturers that will insure to the consumer products that have been properly coated with zinc.

Galvanized, or zinc-coated, metal for all uses has been much on trial with the general public for the last four or five years. Especially is this true in connection with zinc-coated material exposed to dampness. The best European practice has always conformed to a higher standard than that obtaining in the United States. Therefore, if the American zinc industry is to compete for the world's galvanized (zinc-coated) business, or even satisfy the requirements of the American public, says the Institute, it must take cognizance of the serious situation that faces it in this respect.

It is not the purpose of the Institute arbitrarily to recommend a single standard for all galvanized (zinc-coated) material. Neither is the Institute going to force certain standards upon manufacturers. It plans merely, through one of its committees, carefully to test galvanized (zinc-coated) materials that are purchasable in the open market and ascertain the quality and durability of the material for the specific purpose intended. When sufficient tests have been made, the Institute will recommend a standard for each general line of galvanized (zinc-coated) ware and tell the general public about it in its forthcoming national advertising campaign.

The American Zinc Institute contemplates allowing those galvanizing (zinc-coating) manufacturers whose products conform to these standards to use a symbol of quality mark as an identification of excellence. The Institute states that its policy remains one of fullest co-operation.

## Indiana Department of Conservation Combining Scientific and Industrial Research

A study of some of the geologic problems of a stratigraphic and economic nature is at present engaging the attention of the technical corps of the Division of Geology of the Conservation Department of Indiana. The investigations in the field and laboratory are being carried on in co-operation with the members of the Department of Geology of Indiana University.

Among the lines of investigation undertaken is a study of the stratigraphy of the Mississippian series of rocks, by Dr. C. A. Malott. Extensive investigations of the upper Mississippian rocks of Indiana have not been made previously, and much confusion has arisen because of the lack of exact knowledge of the stratigraphic conditions, especially in connection with the study of the structural conditions in the area of outcrop of these rocks. There exists in Indiana a large series of rocks belonging to the Chester group, to which formational names have never been given. These rocks are being studied with a view to correlating them with rocks of the same age in other states.

A survey of the coal resources of the state is being made. There are a number of unsolved problems connected with the stratigraphy of the late Pennsylvanian strata in Indiana and the solutions for these problems are being sought.

A survey of the oil shales of the state is also being concluded. The work on the Devonian shales has been completed and other shale areas are being investigated.

## New York to Have Conference on Immigration

A conference on immigration that will be national in its scope is to be held at the Hotel Astor in New York City on Dec. 13-14. This is the result of efforts made by the National Industrial Conference Board to have the question of immigration thoroughly thrashed out. Leaders in industry and public affairs realize that Congress will soon be confronted with the need of determining a sound policy in this respect. All sessions of the conference will be public.

All questions for discussion, including those which embody such proposals as control of the quotas abroad, reduction or increase of quotas, the adoption of the so-called Canadian system, the administration of the literacy test, and many other aspects of the problem, will be discussed by the proponents and opponents of all the plans advanced by various industrial and business groups and social factors.

## Equipment Novelties To Be Seen at Power Show

The National Exposition of Power and Mechanical Engineering is to be held in the Grand Central Palace, New York, from Dec. 3 to 8, 1923. The materials handling equipment to be exhibited will include conveyors of all kinds, fireless steam locomotives, industrial trucks, elevators, hoists, and large scales. Many novelties are said to be on the list.

The managers of the exposition are Fred W. Payne and Charles F. Roth, with offices in the Grand Central Palace.

## MEN YOU SHOULD KNOW ABOUT

**Robert J. Grant,** a mining engineer, who has been actively connected with the industry in the western states, in

© *Harris & Ewing*
*Robert J Grant*

Mexico, and in Australia since 1889, has been selected by President Coolidge to be Director of the Mint. For the last two years, Mr. Grant has been superintendent of the Mint at Denver. In recommending Mr. Grant for this place, Treasury Secretary Mellon pointed out that the appointment is a non-political one, and was made in a desire to follow wherever possible the advancing of competent men within bureaus. Mr. Grant was born in Nova Scotia, but early in life was brought to Boston by his parents. In 1888, he went to Colorado, and a year later accepted a place with a mining company in Arizona. He was connected with gold and silver operations in that state until 1895. He then returned to Colorado, where he engaged in mining at Aspen and Cripple Creek. He spent several years at the Independence mine. In 1903 and 1904 he conducted a consulting practice. He examined a number of mines in Mexico, prominent among which was the La Luz property in Guanajuato. Late in 1904, Herbert Hoover sought his services in connection with one of the Australian properties of the company of which Mr. Hoover was managing director. As manager of the Cosmopolitan mine, at Kookynie, Mr. Grant reduced the average cost of producing a ton of ore by 40 per cent. In 1916 he returned to Denver and again undertook a general engineering practice, during which he examined a large number of mines in the United States, Canada and Mexico. In 1917, Mr. Hoover selected Mr. Grant to be Food Administrator for Colorado.

**Courtenay De Kalb,** after a visit in Los Angeles, has gone to Tucson, Ariz.

**Charles Camsell,** Deputy Minister of Mines for Canada, has returned from Europe.

**J. B. Quigley,** of Kantishna, Alaska, is in New York. He expects to return to Kantishna next March.

**David Johnston,** of Toronto, has examined a group of claims at Kitsumgalum Lake, British Columbia, in the interest of Ontario capitalists.

**C. Colcock Jones** has returned to Los Angeles and reopened his office at 920 C. C. Chapman Building, after an absence of two years in various parts of Mexico.

**Arthur A. Cole,** mining engineer for the Timiskaming & Northern Ontario Ry., has returned from a trip to the Lake Fortune and Rouyn gold fields of Quebec.

**Oscar H. Reinholt,** who resigned from the government service last August, has returned to Washington from California, and is completing a new book on petroleum.

**Charles C. Starr** is supervising diamond-drilling operations for the Porcupine Goldfields Development & Finance Co., Ltd., in the Matachewan district of Ontario.

**A. E. Bendelari,** vice-president and agent for the Eagle-Picher Lead Co., was married on Nov. 17 to Mrs. Edward T. Hutson, of New York, at the home of Dr. John Schaeffer, in St. Louis, Mo.

**Cyril W. Knight,** geologist, is a member of a party sent out by the Nipissing Mining Co. for preliminary work on the Powell claims, Rouyn, on which the company has acquired options.

**R. L. Chase,** of Denver, is at present in Sinaloa, Mexico, examining various mining properties there. From there he will go to the State of Chihuahua, returning to Denver in February.

**Thomas P. Sharman,** a British engineer who has been in Colombia for some time conducting oil and mining investigations, has returned to London, where his address is 10K, Hyde Park Mansions, London, N. W. 1.

**Prof. W. Arthur,** who has been in the chemical department of the General Electric Co. at Schenectady, N. Y., has assumed direction of the department of chemistry at the New Mexico School of Mines, Socorro, N. M.

**K. L. Kithil** has resigned as manager of the rare metals department of the Metals Exploration Co. and as consulting engineer for the Radium Company of Colorado and is continuing his professional work as a consulting mining and industrial engineer, in Denver.

**Arthur P. Davis,** the past president of the American Society of Civil Engineers, who was summarily dismissed as Director of the Reclamation Service by Secretary Work, has been elected to honorary membership by the Washington Society of Engineers. This honor has been conferred on only four others. They are: Commerce Secretary Hoover, Admiral H. T. Endicott, Admiral D. W. Taylor, and Dr. F. H. Newell. Mr. Davis now is in England representing the Department of State on engineering matters coming before the Pecuniary Claims Commission.

**William E. Wickenden,** assistant vice-president of the American Telephone & Telegraph Co., has accepted appointment as director of the Society for the Promotion of Engineering Education, for which the Carnegie Corporation of New York on Oct. 31 made an appropriation of $108,000.

The resolution adopted by the Carnegie Corporation sets aside for the purpose $24,000 during the present fiscal year and $12,000 during the fiscal year 1924, with the understanding that if, in the judgment of the executive committee, substantial progress shall have been made in this study by Jan. 1, 1925, the balance of the $108,000 will be made available to the society as follows: $24,000 additional during the fiscal year 1924, $48,000 during the fiscal year 1925.

Mr. Wickenden is a native of Toledo, Ohio, and a graduate of its public schools and of Denison University, 1904. He has had extensive teaching

*William E. Wickenden*

experience, and in 1917 he made a study of educational and personnel problems for the engineering department of the Western Electric Co., which led to the creation of a personnel department, of which he became personnel manager in 1918. Later he became chairman of the Western Electric Co.'s personnel committee. He served in 1918 as regional supervisor of personnel methods for the Students' Army Training Corps. In 1921 he was transferred to the headquarter's staff of the American Telephone & Telegraph Co., as assistant vice-president in charge of the recruiting and development of supervisory and technical personnel for the group of companies making up the Bell System.

Mr. Wickenden is chairman of the educational committee of the American Institute of Electrical Engineers; chairman of committee on relations with engineering colleges, American Management Association; recently chairman committee on business training, Society for the Promotion of Engineering Education. He is a member of Sigma Chi, Phi Beta Kappa, and Sigma Xi fraternities, and now a resident of Upper Montclair, N. J.

**R. A. Bryce,** of Toronto, has been visiting New York.

**Hamilton B. Wills,** president of the Keeley and Vipond mines, is recovering from a stroke of paralysis.

**A. F. Keene** has changed his address to 42 Broadway, New York City, where he has opened an office as consulting mining engineer.

**R. B. Watson,** general manager of the Nipissing mine, in Cobalt, is in the hospital in Toronto, recovering from an attack of pneumonia.

**Frank W. Collins,** mechanical engineer for the Cerro de Pasco corporation, has returned to San Francisco from La Oroya, Peru.

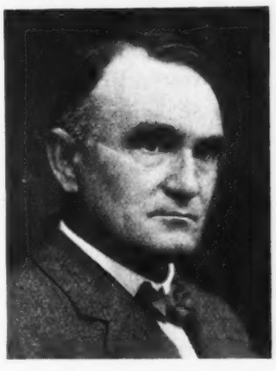
**Arthur B. Parsons,** assistant editor of the *Journal-Press,* on Nov. 15 visited the salt mine of the Retsof mining company, at Retsof, N. Y.

**Edward H. Robie,** assistant editor of the *Journal-Press,* has returned to New York after visiting mining districts in Missouri, Arizona, and Mexico.

**Underwood Nazro,** vice-president and general manager of the Gulf Production Co., Houston, Tex., has returned to Houston from his vacation in California.

**A. W. Allen,** assistant editor, is in New York supervising the preparation of matter for the 1924 Year Book of the *Journal-Press,* which will appear on Jan. 19 next.

**J. A. Bownocker,** state geologist of Ohio, who recently returned from Europe, is directing an extensive research into the distribution, thickness, and field relations of Ohio clays. The Ohio Survey also has in press or in preparation a considerable number of bulletins and reports covering the geology, geography, and natural industrial resources of the state.



*J. A. Bownocker*

**Prof. Henry Lloyd Smyth,** of Harvard, and **Dudley S. Dean,** secretary-treasurer of the Keweenaw Association, are making a trip of inspection over the Michigan iron ranges.

**T. A. Rickard** and **G. J. Young** are now at the new western headquarters of the *Journal-Press,* at 883 Mission St., San Francisco—not at 833, as the types made us say last week.

**Henry S. Rade,** petroleum geologist, formerly connected with the Arkansas Natural Gas Co., at Shreveport, La., has recently joined the geological staff of the Rycade Oil Co., with headquarters in Houston, Tex.

**W. G. Norrie-Lowenthal,** who has been in charge of the mills of the Mountain Copper Co., at Matheson, Calif., has been appointed mine manager of the Porcupine properties, with address at South Porcupine, Ontario.

**R. L. Dudley,** president of the Gulf Publishing Co., Houston, Tex., has been elected president of the Houston Dispatch Publishing Co., publishers of the *Houston Dispatch,* an independent morning newspaper. Mr. Dudley will serve on the executive committee of the *Dispatch,* but will continue to devote the major part of his time to the *Oil Weekly,* one of the publications of the Gulf Publishing Co.

**Harrison E. Clement** has been appointed general manager of the Porcupine Paymaster Mines, Ltd., and the United Mineral Lands, Ltd., operating properties in the Porcupine district, Ontario, in addition to the management of the Crystal Copper Co., operating the Goldsmith mine, at Butte, and the Crystal mine, at Basin, Mont., owned by the same interests. His addres is 825 McIntyre Building, Salt Lake City, Utah.

**J. S. Wallace,** who has been identified with the Bunker Hill & Sullivan Mining & Concentrating Co. and allied companies for many years, has opened a law office in the Crocker Building, San Francisco, and will specialize on tax and business law relating to mining corporations. Mr. Wallace has spent the better part of the last three years in Washington in connection with the tax problems of the companies under F. W. Bradley's control.

**Walter Herd** has been appointed chief mining engineer of the British Empire Steel Corporation, with jurisdiction over all mines and mining properties of the constituent and subsidiary companies. Mr. Herd is a member of the Institute of Mining Engineers of Great Britain and the Canadian Institute of Mining and Metallurgy. He received his technical education at Heriot Watt College, Edinburgh, and held managerial positions in Scotland and South Wales before coming to Canada. Since 1912 he has had charge of important mining operations in Cape Breton for the Dominion Coal Co.

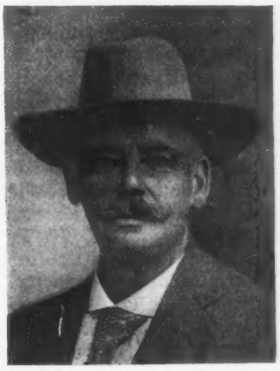
**H. E. T. Haultain,** professor in the department of mining engineering in University of Toronto, on Nov. 13 addressed the technical staff of the U. S. Bureau of Mines and engineering students from Carnegie Institute of Technology in the auditorium of the Bureau at Pittsburgh. The subjects, illustrated by moving pictures, were the action of grinding in ball mills and the action of crushing rolls. Professor Haultain is presenting his pictures before students and mining men in eight different cities in the East, and they are attracting great interest.

## OBITUARY

**Ethelbert George Woodford** died at the Minor Hospital in Seattle, Wash., on Friday, Nov. 9, at the age of seventy-three years. Mr. Woodford was born at Cold Springs, N. Y., on July 12, 1850. He received a collegiate education in England.

Mr. Woodford was associated with his father in engineering and consulting work in England in his younger days, taking active part in many large construction projects, among which may be noted the Blackfriars Bridge at London, England. After the death of his father Mr. Woodford entered into consulting practice in London. In 1879 he became chief engineer for the Kimberly Diamond Mines, of South Africa. Later he became chief engineer of mines for the Transvaal. In 1888 he was appointed chief engineer of railways and mines for the South African Republic, which position he held until his resignation, just before the Boer War, in which he took part on the Boer side. He later returned to the United States, and afterward to London, thereafter having charge of many mine development projects in Russia, Siberia, Central and South America, Alaska, and the United States, up to the time when the Great War broke out, when he was in Seattle, Wash., which city had up to the time of his death been his home.

Mr. Woodford was a member of the following societies: American Institute of Mining Engineers, American Society of Civil Engineers, Institution of Mechanical Engineers of London, Mechanical and Civil Engineering Institute, Society of Engineers, London; Austrian Institute of Engineers, Royal Geographical Society of London, Lisbon Geographical Society, and the Royal Statistical Society. He leaves, besides his wife, a son, John Woodford, and three daughters—Mercedes and Esther Marion Woodford and Mrs. H. A. Russell.



*Ethelbert George Woodford*

# THE MINING NEWS

**The Mining News of ENGINEERING AND MINING JOURNAL-PRESS is obtained exclusively from its own staff and correspondents, both in the United States and in foreign fields. If, under exceptional conditions, material emanating from other sources is published, due acknowledgment and credit will be accorded.**

## Summary of the Week

*THE Pacific Steel Corporation has closed an option whereby it obtains 230 acres of land at Long Beach, Calif., for the construction of an iron blast furnace plant. The exploitation, on a large scale, of iron ore deposits in Utah and California, coal from New Mexico, and limestone from southern California is planned.*

*Fire destroyed fifteen buildings at the plant of the National Lead Co. at Bonne Terre, Mo., on Nov. 15.*

*The Eagle-Picher Lead Co. has absorbed the interests of the Ontario Smelting Co., including its smelting plant, zinc lands, and leases in the Joplin-Miami district.*

*Canadian gold producers have asked the government either to continue payment of bullion in New York funds or to annul the embargo on exports.*

*Kirkland Lake gains importance in gold mining in northern Ontario as new oreshoots are found.*

*The Griffin Mining Co. is completing its flotation plant near Leadville, Colo.*

*A decision of the Michigan Supreme Court makes the Calumet & Hecla Co. liable for a $50,000 corporation tax.*

*A receiver has been named for the Connecticut Zinc Corporation, operating in the Joplin-Miami district, on complaint of majority bondholders.*

*The Copper & Brass Research Association will renew efforts to increase industrial outlets for these metals.*

*State officials in Colorado have instituted the first prosecution under the new State Securities Act designed to curb fraudulent promotion.*

*J. H. Shockley, returning from Alaska, forecasts increased activity in lode-gold mining in the interior parts of the territory.*

### Eagle-Picher Lead Co. Buys Ontario Smelting Interests

**Smelter, Land and Leases in Joplin-Miami Zinc District Involved in Large Transaction**

Announcement was made Nov. 15 that the Eagle-Picher Lead Co. has purchased 520 acres of land in the Joplin-Miami district from the Ontario Smelting Co., and has also taken over a long-time lease on the latter company's smelting plant near Hockerville, Okla., and the forty-acre tract on which it is located.

The transaction is one of the most important completed in the Joplin-Miami field for some time. The consideration is not made public, but is known to have been large. Announcement of the closing of negotiations was made jointly by Jesse G. Starr, president of the Ontario company, and A. E. Bendelari, vice-president of the Eagle-Picher Lead Co., both of Joplin. Mr. Starr will continue as president of the Ontario Co., the activities of which will necessarily be small. He is also president of the Quinton Spelter Co., and will continue in that capacity.

The Eagle-Picher Co. will use the Ontario plant for the making of antimonial lead, and will actively develop the various mining tracts included in the acreage taken over.

The lands purchased in fee include eighty acres of the Imbeau land at Hockerville, part of the original 120-acre smelter tract of the Ontario company, an eighty-acre tract in the Kansas field, between the Chanute Spelter Co.'s Hartley and Brewster mills; a 120-acre tract of the Fancher land, due north of Hockerville, west of Baxter Springs, Kan.; a portion of the Lytle land, east of the Blue Mound tract; and 120 acres of the Xavier land, situated about three-quarters of a mile west of the Bob White mine of the Commerce Mining & Royalty Co.

This transaction assures the position of the Eagle-Picher Co. as one of the largest ore producers in the Joplin-Miami district for many years.

### Silver Organization Committee Busy; Report Soon

REPRESENTATIVES of silver producers in the Western States and Mexico, as members of the committee appointed by W. Mont Ferry of Utah, after the Reno Silver Conference, to formulate plans for the formation of an organization of American silver mining interests, met in New York on Nov. 15. Later, a second session was held at Washington, D. C., where the legality of the proposed organization was discussed with Secretary Hoover. A statement reporting the conclusion reached will be issued soon.

### Bunker Hill Will Soon Unwater Minnie Moore Workings

**Old Property, Once Lead-Silver Producer, To Be Explored at Greater Depth**

Operations of the Bunker Hill & Sullivan Mining & Concentrating Co. on the Minnie Moore mine, near Hailey, Idaho, in the Wood River district, are rapidly approaching the objective set many months ago.

The Allen shaft is near the point where connection will be made with the extensive old Minnie Moore workings, in which the water is standing 200 ft. above the point of connection. As the new workings approach the old, drill holes are being carried ahead of the face, and as soon as the holes enter the old workings they will be drained through the small openings. As soon as the old workings are drained the Allen shaft will be sunk to the 900 level, where a strong mineralized vein is known to exist. The grade of the ore remains to be determined.

The Minnie Moore in the early history of the district was a heavy producer of high-grade lead-silver ore and has been under bond to the Bunker Hill company for some time. Extensive exploration by the company has been outlined, and work is approaching the point where developments will prove or disprove the existence of workable ore-bodies.

# Kirkland Lake, in Ontario, Gains Importance as Gold District

## Freight Congestion Delays Construction Work—Lake Shore Mill Alterations Delayed Till Next February—Teck-Hughes Has Good Ore on 1,150 Level

*By Our Special Correspondent*

THE Kirkland Lake district of northern Ontario is rapidly forging ahead, and every day is gaining a more important place in the gold-mining industry of northern Ontario. Though a great deal of construction work is going on, this is hampered by the freight congestion. At the present moment there are forty-seven cars of freight for the district waiting at Swastika, the near est railroad point, to be unloaded, while the siding has a capacity of only seven cars a day. This means that construction material is sometimes held up for weeks, and is greatly retarding progress, particularly in the case of the Lake Shore mill.

Owing to delays in delivery and to the freight congestion, the company now finds that it will be unable to have the mill addition completed this year, and will probably not have it in operation until next February or March. Development at the mine, however, continues to be satisfactory. The main vein has been cut at the 800 level, where the values compare favorably with those on the upper levels. At 600 ft. the vein shows almost continuous ore for a length of 900 ft. It is of exceptionally good grade and in one stope, 350 ft. long, the average is $50 per ton. On account of the delay in getting the enlarged mill going, the management has decided to proceed immediately with sinking the shaft to the 1,000 level.

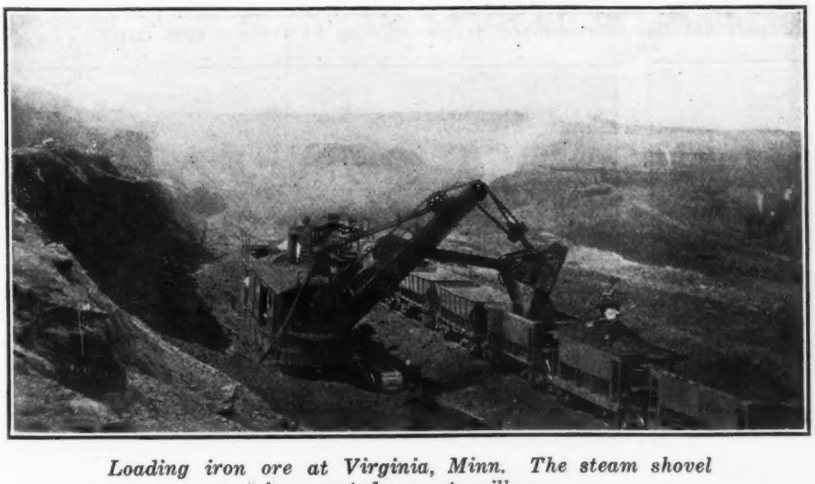
On the Wright-Hargreaves property the best ore to date has recently been encountered as the drifts are being driven toward the Lake Shore boundary. It is expected that this will probably result in higher average mill heads. The mill capacity is being increased.

At the annual meeting of the Teck-Hughes held a short time ago in Buffalo, it was reported that developments on the 1,150 level were satisfactory. There have been various rumors current regarding the absence of values on this level, but the management reported that already 400 ft. of ore, comparable in richness with anything in the mine, had been developed. It also stated that 15,000 tons of tailing, running from $4 to $5 a ton, had been impounded and that this had not been included in the estimate of ore reserves.

The company's finances are in good condition, and the outstanding bonds, which amounted to $176,000 in August, will be paid off on the next interest date, Jan. 1. At that time it is expected that when the bonds are paid off the company should have a cash surplus of about $200,000.

The Kirkland Gold has recently encountered some new ore on the 400 level, and developments on the Tough-Oakes continue to show promise. Work continues at the Burnside, the adjoining property, which is now controlled by the Tough-Oakes interests.

At the Argonaut property, a few miles from Kirkland, higher heads are being obtained, the average for the first few days in November being $17 a ton. The company announces that early in the new year the mill capacity will be raised to 200 tons a day, and it is stated that a good profit is being realized. A great many metallurgical difficulties were experienced on account of the presence of copper in the ores. For a time the company used amalgamation and flotation; then later amalgamation, flotation, and cyanidation of the tailings. As greater depth is attained, however, it is found that the copper content decreases, so that it is now possible to use straight amalgamation and cyaniding, which will be the process in the future.



*Loading iron ore at Virginia, Minn. The steam shovel is mounted on caterpillars*

## Promoters of Arsenic "Enterprize" in Colorado Charged With Fraud

### Suggested 600 Per Cent Profit in Ninety Days—Has Neither Ore Nor Plant, Believe Officials

Secretary of State Milliken of Colorado has begun the first prosecution under the state Securities Act by filing with the District Attorney an information charging the Capitol Syndicate and John G. Powell, one of the incorporators, with failure to comply with the law. It is charged that the defendants were selling stock to the general public without filing the necessary declaratory statement.

The advertising of the company attracted considerable attention on account of its sensational character, which offered the stock of the Arsenic Production Co. at 2c. per share, and held out the promise of 150 to 600 per cent profit within ninety days. The advertisement stated that the production of arsenic was first undertaken by this company, that the industry was assuming boom proportions, and that the company controlled vastly important deposits of arsenic in Colorado, with its principal mine in Boulder County.

It is claimed that the Boulder County property does not contain arsenical ores in commercial quantity, and that the company has no facilities for extracting the arsenic, if it did. Penalties for the violation of the Securities Act, or "blue-sky" law, include a fine, or imprisonment, or both.

## Ford Prospects Own Iron Land; Not in Market for Mines

### Drilling on Marquette Range—Now Has Fleet of Four Lake Freighters —Independent of Other Shippers

Henry Ford has placed more diamond drills at work on his lands in northern Michigan, and it is expected that before long he will have more than one iron-ore mine in the Lake Superior region. He now has a drill at work at the old Riverside mine, two miles to the northwest of Republic, on the Marquette range, and another drilling a short distance to the southwest of that point. The drill that was being operated at Three Lakes, on the Marquette range, is now being moved nearer Republic.

It is reported that Ford will next year drill near the old Bessie mine, at Humboldt, also on the Marquette range. He is making a systematic search for iron ore on his large acreage, a large part of which contains the iron formation. He is not interested in the mines of anyone else, and has turned down every property that has been offered to him.

Ford has purchased two large Lake freighters, which, with the two now being built for him, will give him a fleet of four carriers on the Great Lakes next year. He will transport all of his own ore, whereas this year he was dependent upon other shippers. This caused him some inconvenience.

# Lode-gold Mining in Northern Alaska Is on the Verge of a Boom, Says Engineer

## J. H. Shockley Returns From Chandalar District—Transportation Biggest Need—Mill Will Be Erected—Climatic Difficulties Overestimated

THE NEXT DECADE unquestionably will see the development of a large and prosperous lode-gold mining industry in northern Alaska, well within the Arctic Circle, according to J. H. Shockley, mining engineer of New York, who has just returned from a summer spent in the Chandalar region in the Endicott Mountains and in other sections of the territory. The government railway, the gasoline tractor, the airplane, and the radio will play an important part in the opening of the country, hitherto accessible only with great difficulty. Lack of rapid communication and transportation for both light and heavy loads has prevented even superficial prospecting with a few exceptions. The rich placer gold of the Yukon and its tributaries came from somewhere; the mother lodes are there and wait to be revealed and exploited.

The particular purpose of Mr. Shockley's visit was to report for clients in New York on the property of the Chandalar Gold Co., situated about 120 miles northeast of Beaver, on the Yukon. He has recommended the erection of a small stamp mill, which has already been delivered at Beaver, and the active operation of the Mikado group of claims, where a shaft 125 ft. deep has been sunk on a strong 4-ft. vein that averages more than $110 per ton. A crosscut tunnel is rapidly approaching the point where it will cut this vein at a depth of 450 ft. Excellent "showings" have been opened on the neighboring Little Squaw, Last Chance, Woodchuck, and Envelope claims, the gold being free in every instance. The area that has been carefully prospected comprises about 100 square miles. The country rock is an altered schist, across which cut intrusive rocks, mostly diorite. The ore zones of which four can be identified readily can be traced for thousands of feet, according to Mr. Shockley, and samples obtained from surface trenches are uniformly good. Hand specimens that he has with him suggest at least patches of real high grade. He is confident that there is plenty of gold not only in this particular vicinity but in other districts.

But this is by no means the only interesting part of his story. Although it is true that the thermometer drops pretty low in the winter time, the average all-year climate is by no means bad, especially for underground mine operations. Even in the cold months there is no need for discomfort if a well-built cabin is available, and the summers are ideal. During the growing season 4-lb. potatoes are raised and excellent stands of hay and oats are the usual thing.

Game is remarkably abundant, both feathered and furred. On the trip from Beaver to Chandalar grouse, pheasant, duck, geese, ptarmigan, rabbit, squirrel, deer, moose, and caribou may be found. Perhaps, in selecting prospectors it would be better to exclude those whose taste run to hunting live things instead of gold. The accompanying pictures indicate that the country is not as forbidding as most people think.

*Sluicing on Big Creek in the Chandalar district*

*The caterpillar tractor does very well hauling freight in Alaska*

*One way of getting mine timbers up the mountain side*

*This is the mill site of the Chandalar Gold Co. The mine is three miles away*

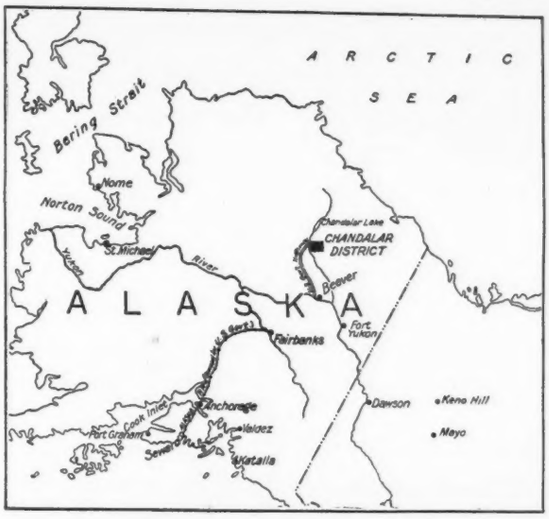
*Eating moose, caribou and bear meat is said to make these Chandalarians unusually vigorous*

The tractor which is illustrated here does not run out of Beaver, but this type of transportation is proving highly efficient in a large number of districts. One route out of Fairbanks covers a regular run of 182 miles and return.

The U. S. Government is doing excellent work in the construction of new roads. A highway from Chatanika to Beaver now being opened will form a connecting link between Chandalar and the Alaskan Railway. Transportation of passengers and light freight by airplane has proved practicable, and a number of airplanes are engaged commercially in the business.

The third modern means of improved communication is the radio. The establishment of a wireless station at Beaver has been promised for next spring, and it is reasonable to conclude that before long the residents of interior Alaska will get regular news from outside as promptly as anyone else.

Mr. Shockley foresees the early development of numerous profitable lode-gold mines. New roads will become necessary, and the improved transportation will encourage other prospectors so that still more deposits will be found. That is, of course, the reasoning of an optimist, but except for the optimist few mines would ever have been found and the frontiers of civilization would never have been pushed back as far as they have.




*Map of northern Alaska, showing the Chandalar district*

## Miner Gets Compensation for Damage to Ears

The Park City Mining & Smelting Co. and the United States Fidelity & Guaranty Co. have been ordered by the Utah Industrial Commission to pay compensation to Valerio Rossi for injury to his ear drum resulting from a blast while he was in the employ of the mining company. Rossi is to receive $16 a week from March 9, 1923, to May 23, 1923, and is also to be reimbursed to the amount of $276 for money paid for medical services.

## Magnesite Producers Must Catch Dust, Is Court Decree

THE Supreme Court of Washington has awarded damages of $9,932 to John Ehorn against the Northwest Magnesite Co. for damage to land owned by Ehorn by accumulation of dust from the magnesite company's calciners. By the decree the company is prohibited from operating when dust emanation from the plant being released into the atmosphere exceeds 8 per cent of the amount of dust which passes from the kilns of the plant. The company is further enjoined from the operation of the plant until dust precipitation devices are installed.

## Pacific Coast Steel to Build $5,000,000 Blast Furnace

### New Railroad Outlet for Southwestern Colorado, and Improvements of Long Beach Harbor Planned

The Pacific Coast Steel Corporation, with mills in San Francisco, Portland, and Seattle, iron deposits in Utah and southern California, and coal deposits in Utah and New Mexico, has completed arrangements to establish a $5,000,000 blast furnace plant, with by-products ovens, at Long Beach harbor, California. The plant will be built upon a 200-acre tract acquired from the Los Angeles Dock & Terminal Co. A payment of $153,333.33 has been made on this, the total price being $2,000,000. As a further guarantee that the blast furnace will be in operation within two years, a bond of $500,000 was filed on Nov. 8 by the steel company.

To accommodate this plant it will be necessary to make some changes in existing harbor lines and to dredge the harbor front of this property to a depth of 32 ft. To protect the city of Long Beach in this work, D. M. Reynolds, representing the steel corporation, has filed with the city council a bond of $250,000 in earnest of the fulfillment of the terms of his contract.

Considerable expenditures have been made to date in diamond drilling the Vulcan iron deposits in San Bernardino County near the Nevada state line, and in drilling deposits of coking coal held by this company in the San Juan coal fields in northwestern New Mexico. The carrying out successfully of these plans depends upon the construction by the Santa Fe railroad of a branch line 115 miles long to run north from Gallup, N. M., across the Navajo Indian reservation to the coal fields above mentioned. Such a road would also tap the new oil fields in the San Juan Valley. A connection will be made with the Denver & Rio Grand at either Aztec or Farmington, N. M., and this will furnish a much-needed outlet to the south and west from the Silverton quadrangle that will be open all the year around. The Santa Fe railroad is working upon an extension of its line from Redondo to Wilmington, Calif., which will be continued into the steel corporation's property at Long Beach harbor. It is estimated that this plant when in operation will produce about 1,000,000 tons of freight per annum.

## Utah Mines Bear One-tenth of State's Tax Burden

The assessed valuation of the mineral content of Utah mines—assessed according to the state law at the rate of three times their net proceeds—is this year $24,906,885 as compared with $5,458,995 last year, showing an increase of $19,447,860. During the same period the total assessed valuation for the state increased only $12,222,066, so that it is evident that the assessed valuation of other property in the state decreased. The mines therefore—particularly the metalliferous mines—are this year bearing a much higher percentage of the burden of taxation than they did last year.

The official figures for the total assessed valuation of property in the state this year are $647,754,323, as compared with $635,532,257 last year, and the mines—including coal mines and hydrocarbons, as well as metal mines—are assessed at $62,596,788, as compared with $43,825,231 last year. This year, therefore, the mines are assessed at a little less than one-tenth of the total assessed valuation of the state, as compared with an assessed valuation of a little less than one-fifteenth of the total last year.

## Calumet & Hecla Liable for $50,000 Michigan Corporation Tax

Calumet & Hecla is one of 100 corporations in Michigan which will be required to pay a state corporation tax in excess of $10,000 and one of ten which must pay the maximum fee of $50,000 under a recent ruling of the Michigan Supreme Court. The company has already paid $10,000.

The Supreme Court ruled that all corporations must pay under the 1923 amended corporation tax law. This act prescribes a 2½ mill rate, on capital and surplus, with a maximum of $50,000 and a minimum of $10. Inasmuch as the old law specified a 3½ mill rate, with a minimum of $50 and a maximum of $10,000, no protest is expected from the majority of corporations, as they will save money by the new ruling. Approximately 100 corporations, however, will be required to pay in excess of $10,000, and litigation is considered not improbable before the full tax is finally collected.

# Old Alice Mine, in Coeur d'Alenes, Rejuvenated

## G. W. Maurer, Last of Long Line of Lessees, Strikes Rich Shoot —Bunker Hill Company Finances Development of 4 Ft. of 63 Per Cent Lead Ore

THE much-discussed "decline in prospecting" has been accompanied in many districts by the rejuvenation of abandoned mines. A notable example is the old Alice mine, situated about halfway between Wallace and Mullan, in the Coeur d'Alene district, Idaho. Twenty years or more ago the Alice Mining Co. was believed to be potentially one of the big producers of the district. Control was in the hands of the late Richard Wilson and Walter McKay, of Portland, both of whom had made fortunes out of the Mammoth mine, and operations were directed by James F. McCarthy, president and general manager of the Hecla Mining Co., who was also a stockholder.

The development of the Alice included a shaft 600 ft. deep, with development drifts, crosscuts, and raises aggregating about 10,000 ft. A mill of 150 tons' capacity was erected, and after shipping about 4,000 tons of lead-silver concentrates, production was suspended until additional ore could be developed. Efforts in that direction proved unsuccessful, and the Alice was finally listed among the few failures in the Coeur d'Alenes. The plant was later dismantled and all machinery and equipment were sold.

Repeated attempts have been made during the intervening years by leasers to find pay ore, without success, but each succeeding failure has been no deterrent to others to take a chance. Last May G. W. Maurer, of Portland, a young man with considerable mining experience gained in various western mining states, looked over the Alice and reached the conclusion that his unlucky predecessors had overlooked a vein 200 ft. south of the old shaft workings, and he thereupon secured a lease and bond on the property and started to work alone. A tunnel had been started on this new vein many years ago by the original owners, which had caved to an extent that there was little evidence of a vein outside of the material on the dump, almost concealed by vegetation. Mr. Maurer cleaned out the old tunnel, found a little stringer of lead-silver ore in the face, and proceeded to follow it. As the drift advanced the stringer widened and in 20 ft. the face was all in carbonate ore averaging 33 per cent lead and 17 oz. in silver. A little sulphide ore was also in evidence. Day after day Maurer pounded away, without assistance. Few people knew that he was on the job, and those who did merely listed him with the deluded ones who had gone up against the Alice.

In the closing days of September Maurer came down to Wallace and exhibited chunks of galena carrying 63 per cent lead and 30 oz. of silver and announced that he had 4 ft. of that class of ore in the face of the tunnel. The discovery created a mild sensation, and a procession of promoters and would-be promoters headed for the Alice, and numerous were the propositions submitted to Mr. Maurer to finance its development. None of them appealed to the lone prospector who made the strike. He knew he had a good thing, so he turned to a big concern for financial assistance. He went to the Bunker Hill & Sullivan company, and the general manager, Stanly A. Easton, immediately sent an engineer to investigate. As a result, Maurer has closed a contract with the Bunker Hill & Sullivan under which that company will finance and direct development.

Eight men are now employed, equipment has been ordered, including a compressor driven by electric power, and plans contemplate increasing the force as rapidly as conditions will permit. After more than twenty years of successive failures, the Alice now seems destined to become a real mine.

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## Joplin Court Names Receiver for Connecticut Zinc Corporation

### Bondholders Allege Failure to Pay Taxes and Interest by Joplin-Miami Mining Company

The Connecticut Zinc Corporation, which has been operating the famous Oronogo Circle mine at Oronogo, Mo., for several years, has gone into the hands of receivers, following a petition on the part of bondholders. A. J. Burnham, of Joplin, who has been manager of the property, and Ross M. Turner, of New York City, have been appointed receivers by Judge Grant Emmerson.

The receivership was asked by the Fidelity Trust Co., William M. Crombie, John F. Woodruff, J. Herbert Ballantine, George P. Smith, Eugene De Forest, George F. Burgess, Charles F. Bradley, George E. Horton, the Pennsylvania Colliers, Inc., William H. Lyon, E. Welton Frisbie, and Ross M. Turner. In their petition they state they hold outstanding bonds in the corporation to the amount of $958,000.

The mine is one of the best known in the district, having been operated for almost fifty years, practically continuously. It includes a lease of 260 acres, and the largest concentrator in the district, built at a cost of approximately $500,000.

The petition for the receivership states that the company on Nov. 15, 1919, issued bonds for $1,250,000 and that they were to bear interest at the rate of 7 per cent. They were to mature in 1929. It is stated the company has failed to pay its taxes and its license to operate in the state, has other debts amounting to about $15,000, and has failed to pay interest on the bonds since November, 1921.

## Griffin Mill, Near Leadville, Colo., Nears Completion

The Griffin Mining Co. expects to have its new 100-ton flotation plant in operation early in January. The Stearns-Roger Engineering Co. is in charge of construction of the plant, which is situated in the St. Kevin district near Leadville and at the portal of the No. 3 tunnel, on the property of the company. The process will closely follow methods which have already proven successful at Leadville in a smaller way, and, it is generally believed, will prove the solution of the problem of profitably mining and milling the zinc-iron ores of this district.

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## Copper and Brass Association Elects New Board

### President R. L. Agassiz Optimistic Over Increase in Domestic Copper and Brass Consumption

The Copper and Brass Research Association held its third annual meeting at the association's headquarters, at 25 Broadway, New York City, on Nov. 15. The following were elected directors for the ensuing year, the first eight mentioned comprising the executive committee:

R. L. Agassiz, Edward H. Binns, Stephen Birch, F. S. Chase, Walter Douglas, Charles Hayden, C. F. Kelley, H. J. Rowland, J. W. Allen, Henry F. Bassett, H. C. Bellinger, J. Parke Channing, Joseph Clendenin, Carl F. Dietz, B. Goldsmith, E. C. Goss, Robert H. Gross, U. T. Hungerford, C. V. Jenkins, William Loeb, H. B. Paul, Dr. R. M. Raymond, A. B. Seelig, and W. Parsons Todd.

After the meeting the directors elected the following officers:

President, R. L. Agassiz; vice-presidents, C. F. Kelley, F. S. Chase, Walter Douglas, H. J. Rowland, and U. T. Hungerford; treasurer, Stephen Birch; secretary, George A. Sloan; manager, William A. Willis.

R. L. Agassiz, in commenting on the work of the association and the business outlook, said, in part:

"The program for 1924 as approved by the members at today's meeting provides for an extension of the association's activities, in line with our plans to develop new and increased outlets for brass and copper. Copper consumption in this country for the first three quarters of 1923 was greater than consumption for the entire year of 1922. The outlook for 1924 is favorable by virtue of the prospect of continued activity in the three largest brass and copper consuming industries—i. e., electrical, automotive and building construction.

"The use of electricity on a constantly increasing scale is inevitable, and automobile manufacturers predict increased production.

"Copper consumption in the United States at the present time is about 70 per cent of the world's production. Our survey of channels of consumption indicates that the ultimate or potential demand for copper and brass in this country has by no means been reached."

## Canadian Gold Producers Want Free Market for Bullion

**Either Lift Embargo or Pay in New York Funds Is Demand on Government**

The announcement that the Canadian Government contemplates discontinuing the purchase of gold from Canadian mining companies on the basis of the free market price, while enforcing the embargo prohibiting the shipment of gold to the United States, has aroused much adverse comment in Canada. On Nov. 14 a large deputation headed by Charles McCrea, Minister of Mines for Ontario, and J. E. Perrault, Minister of Mines for Quebec, waited upon W. S. Fielding, Finance Minister at Ottawa, protesting against the enforcement of the embargo. They claimed that gold is a commodity which can command the New York price, and that its producers should be permitted to take advantage of this. By refusing to permit its export and at the same time refusing to pay for it at the New York rate, it was urged that the government was imposing a hardship on Canadian producers and discouraging investment in gold mining.

After hearing the deputation Mr. Fielding issued a statement pointing out that though for some time the government had been purchasing gold at the standard price of $20.65 per fine oz. payable when desired by checks on New York, conditions had changed, as there were no longer available funds in New York, and to purchase funds there would, it was estimated, cost the government between four and five hundred thousand dollars a year in exchange. Whether it is expedient to adhere to the embargo policy was a large question, and the government will take time to consider it. In the meantime, licenses to export bullion will be granted to the mining companies, so that they can market directly in New York.

## National Lead Co.'s Plant at Bonne Terre, Mo., Burns

Fifteen buildings comprising the plant of the St. Louis Smelting & Refining Co., south of Bonne Terre, Mo., were destroyed by fire on Nov. 16. The loss was approximately $100,000. The company is a subsidiary of the National Lead Co.

The fire, of undetermined origin, was discovered by workmen at 9 p.m. in the crusher room of the plant. It had already gained much headway and soon the entire frame structure which houses the crusher department was in flames.

Just when it appeared that fire fighters from the plant and from nearby towns had mastered the fire a brisk wind sprung up which fanned the flames again into fury and sent sparks showering on other buildings of the plant.

Officials of the company said it will take several months to rebuilt the plant. Arrangements to divert some of the mine product to neighboring mills may be made so as to minimize the loss in production.

## Cigarette Smoke Points the Way to New Orebodies

**Ahumada Mine, in Mexico, Consists of a Series of Disconnected Caves—Bomb Test Planned**

A unique method of "following the ore" is being used by the Ahumada Lead Co. at its mine in Chihuahua, Mexico. The ore is developed through a series of caves, the interiors of which, along their sides and bottoms, carry deposits of lead in commercial quantity and grade. The ore is generally in the form of sulphates and carbonates, some of which runs as high as 65 per cent lead and 5 to 10 oz. silver.

There has been opened to date on Ahumada ground about 2,100 ft. of caves. The way they are traced is interesting. The Mexican miners are inveterate smokers, and they noticed that smoke was being sucked through cracks in the rocks at certain points. Putting a round of holes at this point, they would break into another cave. This process has been repeated through a series of caves and still the smoke passes out of the end of the last cave found, indicating that there are others ahead. Some of these caves are 100 ft. high by 150 ft. long and 80 to 100 ft. wide. The management is going to try an experiment here with a smoke bomb such as is used to make a smoke screen in warfare. The bomb is to be lighted in the last cave opened, on some feast day when the miners are not on the job. Observers supplied with field glasses will be stationed on the hills surrounding the mine to see if smoke can be discovered coming to surface at any point.

The caves are about 1,200 ft. underground, and it is possible some of them may approach near surface and have an outlet into open air.

# News from Washington

By PAUL WOOTON
Special Correspondent

## Non-Tarnishing Tableware and Automobile Trimming Possible Outlets for Silver

### Bain So Reports to Secretary of the Interior—Bureau Will Undertake Research if Senator Oddie Advises

SYSTEMATIC study of silver and its alloys should result in its wider use in at least two fields, with strong probability of similar results in other directions, according to a report submitted today by the Bureau of Mines to the Secretary of the Interior Department in response to his recent request for a preliminary study of possible new uses for silver in commerce and industry. The possibility of developing a non-tarnishing silver for use in tableware and the arts and of finding silver alloys suitable for trimming automobiles were set forth as the two fields in which a systematic investigation should result in a wider use of silver.

"Silver has been allowed to fit into places where it would satisfy the requirements, and little systematic research to develop new uses has been done," the report stated. "Such research, therefore, has a better chance of success than if the field already had been extensively investigated. Although individual producers and fabricators have not overlooked the possibilities of such studies, it is believed that the situation now has reached a stage where, under governmental direction, these individual investigations could be co-ordinated into a systematic plan of research to increase the commercial and industrial use of silver.

"One of the chief drawbacks to the use of silver for household articles is that it readily tarnishes. If this could be overcome or materially decreased by means of the development of an alloy which would not be excessively expensive it should result in a great increase in the use of silver articles and, in turn, in a large increase in amount of silver consumed.

"It is known that certain metals, including cadmium, when alloyed with silver reduce its susceptibility to tarnish. This is mentioned merely as an example. It is entirely possible that other metals or combinations of other metals with silver would form an alloy less susceptible to tarnish, if not non-tarnishable, under ordinary conditions of use.

"There is further the possibility of developing relatively cheap alloys in which only a small proportion of silver will be used, which, due to the large consumption of such alloys, would result in a large increase in the amount of silver consumed. Silver-aluminum alloys deserve consideration in this connection. One of the uses to which such an alloy might be put would be that of trimming on automobiles. A silver alloy relatively non-tarnishable and solid throughout would have decided advantages over the present nickel-plated trim. The investigation of the possibility of producing such an alloy is worthy of consideration."

Secretary Work has submitted a copy of this report to Senator Tasker L. Oddie, chairman of the Senate Commission of Gold and Silver Inquiry, requesting an opinion from the commission as to whether the public interest would warrant the Interior Department undertaking the co-ordination of individual investigations and the beginning of a systematic study of new uses of silver.

# News from Mining Districts

By Special Correspondents in the Field

## London Letter

### Rhodesian Congo Concessions Has Fine Copper Showing—Diamond Pool Adjustment Pending

By W. A. Doman

**London, Nov. 8**—In venturing his capital in the Rhodesian Congo Border Concessions, A. Chester Beatty has apparently been favored by fortune. Discouraged by some people at first, he never lost faith. Certain indications of mineral deposits had reached him, and he engaged a body of technical men from the Union Minière du Haut Katanga staff to investigate. A considerable time elapsed before anything of value was discovered, but his reward now seems well within his grasp. Even at the present moment he does not know all, as the concessions are extensive and work is naturally slow in such a country. The company has just issued a progress report in which it is stated that a number of copper prospects have been investigated. The principal one is N'Changa, where surface operations indicate orebodies over 700 ft. long, with evidence of continuation of the same formation of both, direct along the strike. The minimum of width exposed is 30 ft. and the maximum 115 ft., while the actual width is said to be probably greater. Across 115 ft. the average is 7.1 per cent of copper, the highest assays being 17.4 per cent and the lowest 3.2 per cent. The prevalent minerals are apparently carbonate, but oxide is probably present. A stream seems to cut the deposit in two. Several samples have been taken, east, west, and north, and values are most encouraging. Copper, however, is not the only mineral, for large deposits of manganese are reported. These are to be left until the railway system is further developed. Graphite also exists, and one of the streams in the eastern portion of the concession is said to contain gold. The directors say they are satisfied that within the total area held by the company mineral wealth of great commercial value will be found.

I learn that the pooling arrangements for the production and marketing of diamonds come up for revision at the end of the year. The Consolidated Diamond Mines of South West Africa, which is the biggest producer in the South West Protectorate, has hitherto had an allotment of 21 per cent. During the last six months the diamond trade has been fairly brisk, and the Consolidated company is said to be agitating for an increased percentage. It could have paid a dividend last half year, and great disappointment was expressed that it did not do so. The directors, however, have conserved the cash, and have about £3,000,000 in hand. This, it is said, they are holding in order to be the better able to bargain with the Syndicate or the group who fix the quotas. The South West Africa fields could apparently flood the market with stones, whereas some of the mines of the De Beers group are reported to be less productive than they have been in the past. A realignment may therefore be made.

## Johannesburg Letter

### Daily Average Output Up in September —New Gold Discovery on Wilge River—Business Dull

By John Watson

**Johannesburg, Oct. 16**—The Transvaal gold output for the month of September was declared on Oct. 10 to be 739,504 oz., having a realized value of £3,346,255. Compared with August, this is a decrease of 29,867 oz., equal in value to £115,915. It must be remembered that September was a thirty-day month, with five Sundays. The average daily output, worked out for September, shows an increase of 1,090 oz. per working day. The native labor returns show an increase of 6,806 natives working on the gold mines as compared with August.

A fresh discovery of gold in the Transvaal is reported from Wilge River, on two farms lying about ten miles south from the Wilge River bridge between Argent and Abor stations on the line from Benoni to Witbank. A prospector named Nelson found a piece of banket in the drift thirteen years ago. This piece carried visible gold and at that time was thought to be an odd piece of Rand deep-level banket, thrown away or dropped there by some one. Recently two prospectors decided to examine the rock formation near the drift, and they found similar pieces of banket. On trenching through surface soil and through 15 to 20 ft. of Dwyka shale, they found a hard blue quartz. In both the shale and quartz were found clay seams, carrying fragments of banket with free gold. The clay, on panning, also showed free gold. Microscopic examination showed the gold to be partly crystalline and partly in nuggets. A small company has been formed to exploit the find. This gold has been found on the farms Welgelegen No. 544 and Stroffontein No. 153, and local geologists are discussing the likelihood of its being an extension of the Main Reef or a portion of what is known as the Pretoria Series.

The Waterberg platinum field is now assuming the position of a mineralized area in process of development. In the case of the farm Reitfontein No. 3—the site of the original discovery of this platinum—it seems the mining rights are divided into three portions, two belonging to the Transvaal Consolidated Lands, the third being retained by the occupier. This latter portion is in the middle of the farm and abutting on the original discovery. A new company, called Rietfontein Platinums, has now been formed to exploit this area.

According to the September returns of the White Labor Bureau, trade conditions in Johannesburg are as dull and depressed as in the previous month. Engineering works are very quiet. Electrical firms report trade as fair. The most flourishing trade on the Rand at present is that of house building.

## Britain Seeks Best Storage-Battery Locomotive

THE Department of Mines of Great Britain has offered a prize of £1,000 for the best design of a storage-battery locomotive suited for use in the deep mines of the British Isles. It is recognized that American competitors for this prize will have a distinct advantage, due to the higher state of development of storage-battery locomotive manufacture in this country. The contest will be open until April 1. Details may be secured from the Secretary Storage-battery Locomotive Competition, Department of Mines, London, S.W. 1., England.

## BURMA

### Burma Corporation Produced 436,000 Oz. of Silver in September

Cable advices received report that during the month of October the Burma Corporation mined 21,770 tons of ore from the Bawdwin mines; 21,440 tons was milled in the treatment plant, producing 10,915 tons of lead concentrate, and 11,530 tons of lead-bearing material was smelted in the blast furnaces, producing 4,475 tons of hard lead for treatment in the refinery. Refinery products were: refined lead, 3,842 tons; refined silver, 436,010 oz. The tonnage milled includes the retreatment of 735 tons of tailing. Of silver production 10,200 oz. was recovered from treatment of copper matte.

Operation of the experimental zinc plant was suspended in order to effect alterations to the mill. In addition to the above, 200 tons of antimonial lead was sold and shipped and 218 tons of copper matte was produced ready for shipment from the treatment of accumulated smelter byproducts.

## Alaska Juneau Records Deficit in October

Alaska Juneau mined during October, 1923, a total of 212,950 tons, from which a recovery of $138,000 (64.8c. per ton) was made. Operating costs totaled $110,500 (mining and tramming, 23.48c. per ton; milling, 25.83c., and other costs 1.88c., a total $0.5931 per ton.) Operating profit was $27,500, from which were deducted $13,000 expenditures on Juneau capital account and $15,500 as interest on indebtedness, a total of $28,500, leaving an estimated deficit of $1,000 for the month.

## ONTARIO

### Anglo-Canadian Explorers, Ltd., Increases Holdings

The Anglo-Canadian Explorers, Ltd., of London, England, has taken over three properties in the Kirkland Lake district, the Queen Lebel, Gull Lake, and Kirkland Townsite. These three were selected out of forty properties submitted to the management. The company acquires a third interest in the Gull Lake and holds options in the other two for periods sufficient to allow of extensive development. Active operations are in progress on all three properties. The company proposes to take up additional options, and its engineers are now engaged in examinations.

### Dome Mines Directors Inspect Property

The directors of the Dome Mines left Toronto on Nov. 13 for a special visit of inspection of the property. It is understood that present plans are to keep the mill running steadily for the rest of the year on a grade of ore which will enable them to meet dividend and other requirements each month, and to devote special attention to underground developments. The costs of mining are now the lowest since the early days of the war, and the company officials are confident of being able to hold total costs under $4 per ton.

## BRITISH COLUMBIA

### Federal Ships from Henderson Mine

The Federal Mining & Smelting Co., operating the Henderson mine near Smithers, B. C., under lease and bond for only a few weeks, is moving ore from the mine to Smithers with tractors and trailers, each tractor pulling a string of trailers. The company is also installing a compressor on the Mamie mine, in the same district. The company has also bonded the Diamond Bell and Silver Queen groups at Owens Lake, 25 miles from Houston on the Grand Trunk Pacific Ry. The ores of this group are silver-copper, which have only been exposed by open pits and trenching.

### Fluorite Ore Shipped to Trail

About 115 carloads of reject from the fluorite mine known as the Rock Candy mine are being shipped to the Trail smelter. The reject from the Rock Candy concentrator contains so much fluorite that improved methods now in vogue makes it valuable.

Owing to restrictions of the embargo on fluorite, it is unlikely that operation in the mine will be resumed.

## IDAHO

### Bear Top Mine Leased

F. C. Moore has taken a bond and lease on the Bear Top mine, situated in that section of the Coeur d'Alene district known as the North Side. Many years ago the Bear Top shipped lead-silver ore. Moore finds quite a large tonnage of lead-silver ore available on two tunnel levels, and evidence that additional ore can be developed with a comparatively small expenditure. Also, the 100-ton mill can be restored with small expenditure. Under these conditions he is convinced that by spring he can have the mine and mill in condition for production, and a careful investigation of transportation costs indicates that the Bear Top can be operated at a profit. Arrangements are now being made to put men on development work during the winter.

### Flotation Plant Will Treat Gold Ore in Idaho

THE Golden Age Junior Mining Co., operating in the Boise Basin district, in Idaho, is building a 150-ton concentrator. J. B. Parker, of Kellogg, metallurgical engineer recently connected with the Bunker Hill & Sullivan company, has gone to Pioneerville to surpervise the construction of the plant. The ore is base gold and the recovery will be made by flotation. The mill will be equipped with Parker flotation machines, devised by Mr. Parker while connected with the Bunker Hill and which are in use by the Bunker Hill company. The ore has been subjected to thorough tests at Kellogg with highly satisfactory results. This will be one of the few cases in which flotation has been adopted for the recovery of gold.

## UTAH

### Park City Ore Shipments Increase

Bingham mines shipped 4,005 cars of ore during the week ended Nov. 10. Shippers were: Utah Copper, 3,792 cars; Utah Consolidated, 143; Utah Apex, 14; Bingham Mines, 10; Montana-Bingham, 2.

Park City Mines shipped 2,407 tons, compared with 2,034 tons the week preceding. Shippers were: Park City Mining & Smelting, 1,156 tons; Silver King Coalition, 956; Park-Utah, 295 tons.

Eureka shipments amounted to 131 cars. Shippers were: Chief Consolidated, 49 cars; Tintic Standard, 36; Colorado, 12; Dragon, 8; Mammoth, 8; Iron Blossom, 6; Eagle & Blue Bell, 6; Victoria, 4; Plutus, 1; Tintic Drain Tunnel, 1.

## MICHIGAN

### Improved Market Would Stimulate Much Work in Copper Country

Many shafts capable of production remain closed in the Michigan copper district, but the majority of these would be reopened with any pronounced improvement in metal prices. Idle properties are the amygdaloid department of Calumet & Hecla Consolidated, Allouez, Centennial, old Osceola, North Kearsarge, South Kearsarge and White Pine, also Calumet & Hecla units, and Franklin, Michigan, Victoria, and Mass. The La Salle mine probably will be operated in the future only through shafts of the Osceola. Higher priced copper also would stimulate exploration and development work, and in this connection, Lake, North Lake, South Lake, Indiana, and Keweenaw are held to have possibilities. Calumet & Hecla Consolidated and other producing companies, including Mohawk, Copper Range, and Quincy, also have an extensive area of copper-bearing lands awaiting future investigation.

### Mohawk Mill Improvements Progress

Mohawk's copper yield per ton has shown an improvement of late, 24 lb., refined, being reported. Average for the year will be 23 lb. About 1,700 tons of copper rock daily is being shipped to the mill. Completion of mill improvements, including installation of regrinders, will enable Mohawk to recover at least one more pound per ton. Installation will continue throughout the winter without interference with operations.

## JOPLIN-MIAMI DISTRICT

### Fehm Mine, Unwatered, Resumes

The Fehm mine, formerly known as the Bankers, situated a short distance northwest of Joplin, has been placed in operation once more by B. Pitts and associates. Draining was begun some time ago, and a 10-in. Texas and a 4-in. Gardner pump were used in lowering the water level to about 140 ft., where it is being held. Ore is being taken out from the 90 and 140 levels.

### Little Pat Mill Started

A. M. Gaines has put his new Little Pat mill in operation, southwest of Picher. The plant is on the same tract of land as the New Chicago, there being 260 acres in the lease. The New Chicago has been a steady producer for the Kanok Metals Co. for some years.

### Coyne Shaft Deepened

The Coyne Lead & Zinc Co. has sunk its east shaft about 30 ft. recently, as part of a plan to connect it with the mill shaft at a depth of 185 ft. The two shafts already are connected at 145 ft. The company also has installed a 150 hp. motor, which will be used to operate the mill, and the 150 hp. gas engine already in use will be maintained to operate the compressor.

### Whisk Broom Produces Again

The Whisk Broom mine is producing again, its concentrator having been started up early in November after an idleness of five months. The mine enjoys the distinction of being one of the smallest in acreage boasting a mill. There are fewer than ten acres in the lease, made possible by the correction strip along the Oklahoma-Kansas state line, which it borders. The mill is situated on the tract of the Gordon Mining Co., and both companies take ore from the mill shaft.

# THE MARKET REPORT

## Daily Prices of Metals

| Nov. | Copper, N. Y. net refinery* | Tin | | Lead | | Zinc |
|---|---|---|---|---|---|---|
| | Electrolytic | 99 Per Cent | Straits | N. Y. | St. L. | St. L. |
| 15 | 13.00@13.125 | 42.375 | 42.875 | 6.90 | 6.60@6.65 | 6.40 |
| 16 | 12.75@13.00 | 42.50 | 43.00 | 6.90 | 6.60@6.65 | 6.30@6.35 |
| 17 | 12.75@12.875 | 42.50 | 43.00 | 6.90 | 6.60@6.65 | 6.30@6.35 |
| 19 | 12.75 | 43.00 | 43.50 | 6.90 | 6.60@6.65 | 6.25@6.30 |
| 20 | 12.75 | 43.50 | 44.00 | 6.90 | 6.60@6.65 | 6.25 |
| 21 | 12.75 | 44.375 | 44.875 | 6.90 | 6.60@6.65 | 6.25 |
| Av. | 12.833 | 43.042 | 43.542 | 6.90 | 6.625 | 6.304 |

*These prices correspond to the following quotations for copper delivered: Nov. 15th, 13.25@13.375c.; 16th, 13.00@13.25c.; 17th, 13.00@13.125c.; 19th, 20th, and 21st, 13.00c.

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for deliveries constituting the major markets, reduced to the basis of New York cash, except where St. Louis is the normal basing point, or as otherwise noted. All prices are in cents per pound. copper is commonly sold "delivered," which means that the seller pays the freight from the refinery to the buyer's destination.

Quotations for copper are for ordinary forms of wire bars, ingot bars and cakes. For ingots an extra of 0.05c. per lb. is charged and there are other extras for other shapes. Cathodes are sold at a discount of 0.125c. per lb.

Quotations for zinc are for ordinary Prime Western brands. Quotations for lead reflect prices obtained for common lead, and do not include grades on which a premium is asked.

The quotations are arrived at by a committee consisting of the market editors of *Engineering and Mining Journal-Press* and a special representative of the Bureau of Mines and the Bureau of Foreign and Domestic Commerce.

## London

| Nov. | Copper | | | Tin | | Lead | | Zinc | |
|---|---|---|---|---|---|---|---|---|---|
| | Standard | | Electrolytic | | | | | | |
| | Spot | 3M | | Spot | 3M | Spot | 3M | Spot | 3M |
| 15 | 62 1/4 | 62 7/8 | 68 | 217 | 217 1/4 | 30 3/8 | 27 5/8 | 32 3/4 | 32 7/8 |
| 16 | 61 1/4 | 61 3/4 | 67 1/2 | 218 1/4 | 218 3/8 | 30 1/4 | 27 1/4 | 32 3/8 | 32 5/8 |
| 19 | 61 3/8 | 62 | 68 | 220 | 220 1/2 | 30 1/4 | 28 1/8 | 32 3/8 | 32 1/2 |
| 20 | 61 | 61 5/8 | 67 | 221 1/4 | 221 3/4 | 30 1/4 | 28 1/8 | 32 1/4 | 32 1/2 |
| 21 | 61 | 61 5/8 | 66 1/2 | 223 3/8 | 224 | 30 1/4 | 28 1/8 | 32 3/8 | 32 3/4 |

The above table gives the closing quotations on the London Metal Exchange. All prices in pounds sterling per ton of 2,240 lb.

## Silver, Gold, and Sterling Exchange

| Nov. | Sterling Exchange "Checks" | Silver | | Gold London | Nov | Sterling Exchange "Checks" | Silver | | Gold London |
|---|---|---|---|---|---|---|---|---|---|
| | | New York | London | | | | New York | London | |
| 15 | 4.33 3/8 | 63 1/4 | 32 13/16 | 92s 2d | 19 | 4.28 | 64 | 33 5/8 | 96s 11d |
| 16 | 4.32 1/4 | 63 3/8 | 32 7/8 | 95s 3d | 20 | 4.34 | 63 7/8 | 33 1/8 | 95s 4d |
| 17 | 4.29 1/4 | 63 3/4 | 33 5/16 | ..... | 21 | 4 35 1/2 | 64 3/8 | 33 5/16 | 95s 1d |

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London silver quotations are in pence per troy ounce of sterling silver, 925 fine. Sterling quotations represent the demand market in the forenoon. Cables command one-quarter of a cent premium.

## Metal Markets

**New York, Nov 21, 1923**

The behavior of the metal markets during the last week has been an excellent illustration of the international relations of prices. Owing to the weakness displayed in London metal circles, the sudden rise in copper was abruptly checked and the slab zinc market declined. Even lead is slightly quieter, although there has been no reflection of this condition in prices. The uncertain political situation abroad is mainly responsible for the lack of strength in the non-ferrous metals there.

### Copper

The copper market has shown a sudden reversal of form. After flirting with a 13 3/8c. price last Wednesday, the market made an almost headlong plunge downward, scaring off nearly all buying, and as soon as it became apparent that the market had turned definitely toward lower prices the situation was aggravated. Sales could only be made by pressure from producers who were willing to sell at daily concessions. The highest price received was 13 3/8c. delivered; the lowest of which we have any record is 13c. Several producers would be glad to sell copper today at the 13c. level. It is rumored that second-hand metal sold at greater discounts, as low as 12 3/4c. Compared with the large volume of business done last week, the contrast in this week's activities is striking. The larger producers have been participants in the market to a small degree only, and at the present time are admittedly asking prices higher than the metal is actually being sold for by smaller interests. Prices of producers are by no means demoralized, and there is a feeling in the trade that if the metal is not pressed on the market for the next two weeks prices will again show an upward tendency. The introduction of a clearer atmosphere in Europe would help a lot in improving the market outlook, but with the strained relations between France and England and the uncertain result of the coming elections the situation is mixed. Export business has been unsatisfactory, foreign prices dropping about as quickly as those in the domestic market.

### Lead

The official contract price of the American Smelting & Refining Co. continues at 6.85c. per lb. New York.

At this level it is possible to obtain lead for late December and January shipment. Prompt lead is scarce and can only be obtained by paying a premium. In fact as high as 7c. New York has been paid for spot lead in good-sized quantities. In general the market has not changed much. If anything it has become quieter with a falling off of inquiries. Nevertheless, prices are firm, with the immediate tendency neither upward nor downward. In St. Louis lead has been sold at prices ranging from 6.60 to 6.65c. One sale was made at 6.70c. The metal is still available at the 6.60c. level, however. In Chicago, 6.75c. is being quoted for prompt shipment. European consumption remains good, and lead is one of the few metals that have a steady demand from the other side. Mexican pig lead is being shipped to Continental points and to England, where it can get a better price than in the United States.

### Zinc

The slab zinc market has sagged, and prices have declined to 6.25c. per lb., East St. Louis, for both prompt and forward metal. Sales have been fair, and the market seems to have been influenced by the drop in copper prices and the easier position of the stock market. It is felt by producers that production is too high, especially in view of the improbability of any immediate export business. That Europe will

again come to the United States for slab zinc seems a foregone conclusion, but not in the near future, in the opinion of one large producer. Foreign buying is highly desirable at this stage of the market, to save it from an accumulation of stocks which may be gathered by the high rate of production that is taking place.

High-grade slab zinc has been sold in the East for 8¼c. per lb., with freight allowances depending upon delivery point.

## Tin

Consumers are continuing their policy of buying from hand to mouth, although a disposition is noticeable among a few of them to inquire for forward delivery. The market has moved about irregularly each day, and prices, as usual, have reflected the violent variations in sterling exchange.

The price of forward tin is New York is the same as that for spot metal.

Arrivals of tin in long tons: Nov. 13th, Liverpool, 100; Straits, 300; 14th, Straits, 90; 20th, Liverpool, 200.

## Foreign Exchange

The exchanges in general of European countries declined during the week. Sterling exchange fluctuated at high as 10c. during a single day, a most unusual occurrence. On Tuesday, Nov. 20, francs were 5.345c., lire, 4.31c. and Montreal funds in New York, 2$\frac{5}{32}$ per cent discount.

## Money in Circulation

A report of the U. S. Treasury shows the following stock of money in the United States on Nov. 1: Gold coin and bullion, $4,168,091,621; gold certificates, $882,633,619; standard silver dollars, $497,727,769; silver certificates, $401,953,453; treasury notes of 1890, $1,448,677; subsidiary silver, $272,905,707; United States notes, $346,681,016; Federal Reserve notes, $2,720,586,630; Federal Reserve bank notes, $16,282,000; national bank notes, $772,606,269. Total, $8,794,881,012; per capita, $43.27.

## Silver

China has shown a greater buying interest during the last week, but the advance in London was chiefly the reflection of the fall in sterling exchange. The market closes quiet and steady.

**Mexican Dollars**—Nov. 15th, 48¼; 16th, 48⅜; 17th, 48⅝; 19th, 48¾; 20th, 48¾; 21st, 49⅛.

## Other Metals

**Quotations cover large wholesale lots unless otherwise specified.**

**Aluminum**—99 per cent grade, 26@27c. per lb.; 98 per cent, 25@26c. London, £115 per long ton.

**Antimony** — Chinese and Japanese brands 9½c. W.C.C. brand 9½@10c. Cookson's "C" grade, 12@12½c. Chinese needle antimony, lump, nominal, 6.50c. per lb. Standard powdered needle antimony (200 mesh), 7@8c. per lb. White antimony oxide, Chinese, guaranteed 99 per cent $Sb_2O_3$, 7.50@8c.

**Bismuth**—$2.55 per lb. London, 10s.

**Cadmium**—75c. per lb. London, 2s. 9d.

**Cobalt**—$3 per lb. for spot.

**Iridium**—$275@$300 per oz.

**Nickel**—27@32c. per lb. for 99 per cent virgin metal. London, £125@£130 long ton.

**Palladium**—$83 per oz.

**Platinum**—$125 per oz. London, £25.

**Quicksilver** — $62 per 75-lb. flask. Quiet. San Francisco wires $60.65. London, £9 5s.

The prices of **Magnesium, Molybdenum, Monel Metal, Osmium, Radium, Rhodium, Selenium, Tellurium, Thallium,** and **Tungsten** are unchanged from prices given Nov. 3.

## Metallic Ores

**Manganese**—Brazilian, 40c. and Caucasian, 42c. per unit. Nominal.

**Chrome**—$19.25 per ton. Nominal.

**Tungsten Ore**—High-grade wolframite, $9; high-grade scheelite, $9.50@$10 per unit. Ordinary grades, $8@$8.25.

**Iron Ore, Magnetite, Molybdenum, Titanium, Vanadium,** and **Zircon Ore** are unchanged from the quotations published Nov. 3.

## Zinc and Lead Ore Markets

**Joplin, Mo., Nov. 17**—Zinc blende, per ton, high, $43.35; basis 60 per cent zinc, premium, $42@$42.50; Prime Western, $41@$41.50; fines and slimes, $41@$39; average settling price, all zinc ore, $42.08.

Lead, high, $83.25; basis 80 per cent lead, $80; average settling price, all lead ore, $82.14 per ton.

Shipments for the week: Blende, 19,301; lead, 1,186 tons. Value, all ores the week, $909,750.

Sellers were slow to accept the same price offerings as last week and the purchase dropped to 13,600 tons, buyers declining to advance prices, except on fines and slimes, which were generally advanced $2 per ton. Lead is higher, commanding $80 basis in a number of instances.

The zinc shipment was the largest of the year, there being but one previous week with 19,000 tons, but that week lead shipments were 400 tons more and lead prices were $122.50, and consequently it is not the high value of the year.

**Platteville, Wis., Nov. 17.**—Blende, basis 60 per cent zinc, $44 per ton. Lead, basis 80 per cent lead, $80 per ton. Shipments for the week: Blende, 513 tons; lead, none. Shipments for the year: Blende, 28,264; lead, 690 tons. Shipments for the week to separating plants, 743 tons blende.

## Non-Metallic Minerals

**Asbestos**—Crude No. 1, $350@$450; No. 2, $200@$250; spinning fibers, $100@$125; magnesia and compressed sheet fibers, $60@$90; shingle stock, $50@$65; paper stock, $30@$40; cement stock, $17@$20; floats, $6@$12. All f.o.b. mines, per short ton, Quebec.

**Graphite**—Amorphous grades, $15@$35 per ton, f.o.b. New York. For Ceylon grades see issue of Nov. 3.

**Barytes, Bauxite, Beryl, Borax, Chalk, China Clay, Diatomaceous Earth, Emery, Feldspar, Fluorspar, Fuller's Earth, Garnet, Gypsum, Limestone, Magnesite, Manjak, Mica, Monazite, Phosphate, Pumice, Pyrites, Silica, Sulphur, Talc** and **Tripoli** are unchanged from the Nov. 3 prices.

## Mineral Products

**Arsenious Oxide (white arsenic)**—13½@14½c. per lb. depending upon delivery.

**Copper Sulphate**—4.90@5c. per lb., domestic product.

**Potassium Sulphate, Sodium Nitrate,** and **Sodium Sulphate** are unchanged from quotations of Nov. 3.

## Ferro-Alloys

**Ferromanganese** — Domestic, 78@82 per cent, generally obtainable at $110 per gross ton, f.o.b. works. Spiegeleisen, 19@21 per cent, $38@$40; 16@19 per cent, $38.

**Ferrocerium, Ferrochrome, Ferromolybdenum, Ferrosilicon, Ferrotitanium, Ferrotungsten, Ferro-uranium** and **Ferrovanadium** are unchanged from the prices published Nov. 3.

## Metal Products

**Copper**—Sheets, 21c. base; wire, 15½c.

**Lead Sheets**—Cut, 10.50c.; full, 10.25c. per lb.

**Nickel Silver**—18 per cent Grade A sheets, 28c.

**Yellow Metal** — Dimension sheets, 18.75c.; rods, 15.75c.

**Zinc Sheets**—Base price, $9.25 per 100 lb., f.o.b. plant.

## Refractories

**Bauxite Brick, Chrome Brick, Firebrick, Magnesite Brick, Magnesite Cement, Silica Brick** and **Zirkite** are unchanged from the Nov. 3 prices.

## The Iron Trade

**Pittsburgh, Nov. 20, 1923**

Finished-steel prices continue to hold at the old levels, in general. Shading in sheets has not increased. In some important lines concessions have been made in the last few weeks in the case of a few large orders. Just now there is hardly any large business going, and on ordinary lots mills are very rigid.

**Pig Iron**—Prices in the Valley-Pittsburgh market have had another shaking out. By small lot sales bessemer is off from $24.50 to $23, Valley. Basic, nominally at $22 ten days ago, can be had at $20.50, Valley. Foundry, at $22, Valley, a week ago on small lots, is now definitely $21, Valley, the Standard Sanitary Manufacturing Co., buying 10,000 tons for December, having been able to do $21 not only on No. 2 but also on No. 2x. Predictions have appeared that bottom is now reached and that consumers will begin taking hold.

**Connellsville Coke**—Prices remain at $3.75@$4 for furnace and $5@$5.50 for foundry, with demand light and market prospects poor.

# COMPANY REPORTS

## Nevada Consolidated Copper Co.

A report of the outcome of operations of the Nevada Consolidated Copper Co. for the third quarter of the fiscal and calendar year 1923 states that production of copper for the quarter was 17,135,383 lb. The following tabulation shows the net production, by months:

| Third Quarter, 1923 | Pounds | Second Quarter, 1923 | Pounds | First Quarter, 1923 | Pounds |
|---|---|---|---|---|---|
| July | 5,254,796 | April | 4,492,031 | January | 3,795,340 |
| August | 5,881,420 | May | 5,052,379 | February | 3,730,692 |
| September | 5,999,167 | June | 5,258,919 | March | 4,254,783 |
| Totals | 17,135,383 | | 14,803,329 | | 11,780,815 |
| Average monthly production | 5,711,794 | | 4,934,443 | | 3,926,938 |

A total of 757,132 tons dry weight of Nevada Consolidated ore, averaging 1.28 per cent copper, was milled, and 15,916 dry tons of Ruth mine direct smelting ore, averaging 7.01 per cent copper, was shipped to the smelter. Besides the company ores received, 80,776 tons of custom ores were milled and the concentrates product thereof smelted. An additional 4,216 tons of direct-smelting custom ore was also received at the smelter.

The cost of production, including all fixed and general charges, except depreciation, and after crediting gold and silver values and all miscellaneous earnings incident to the quarter, was 10.38c. per lb. of copper produced, compared with 10.78c. for the preceding quarter.

The following summary statement shows the financial outcome of operations:

| | Third Quarter 1923 | Second Quarter 1923 | First Quarter 1923 |
|---|---|---|---|
| Operating gain from production of copper | $431,035.36 | $510,552.18 | $446,929.22 |
| Value gold and silver and miscellaneous earnings | 219,719.56 | 152,483.73 | 97,293.46 |
| Nevada Northern Ry., dividend | ..... | 300,000.00 | ..... |
| Total income for quarter | $650,754.92 | $963,035.91 | $544,222.68 |

Earnings for the quarter are based upon an average carrying price of 14.175c. per lb. of copper, compared with 15.261c. for the previous quarter and 15.65c. for the first quarter.

## Ray Consolidated Copper Co.

**Copper; Ray, Ariz.**

The forty-ninth quarterly report of the Ray Consolidated Copper Co., covering the third quarter of the year 1923, states that the total net production of copper from all sources was 16,003,561 lb., as shown in tabulation below:

| Third Quarter, 1923 | Pounds | Second Quarter, 1923 | Pounds | First Quarter, 1923 | Pounds |
|---|---|---|---|---|---|
| July | 4,832,189 | April | 4,968,288 | January | 4,382,657 |
| August | 5,447,123 | May | 5,951,344 | February | 4,253,056 |
| September | 5,724,249 | June | 5,408,067 | March | 5,373,728 |
| Total | 16,003,561 | | 16,327,699 | | 14,009,441 |
| Average monthly production | 5,334,520 | | 5,442,566 | | 4,669,814 |

A total of 702,700 tons dry weight of ore, averaging 1.61 per cent copper, was milled, being an average daily tonnage of 7,638 tons, compared with an average of 7,538 tons per day for the previous quarter. The mill recovery was 72.93 per cent of the total copper contained in concentrating ores, compared with 76.33 per cent for the previous quarter. The underground development was advanced 9,185 ft., making the total development to date 818,435 ft.

The average cost per net pound of copper produced was 12.06c., compared with 11.92c. for the second quarter and 11.99c. for the first quarter. All these costs include fixed and general expenses of every kind other than depreciation, and also take into account miscellaneous income and the value of gold and silver recovered.

The financial results of operations follow:

| | Third Quarter 1923 | Second Quarter 1923 | First Quarter 1923 |
|---|---|---|---|
| Operating profit from production of copper | $343,302.90 | $496,508.95 | $458,988.50 |
| Miscellaneous income and gold and silver | 100,998.56 | 74,636.61 | 29,435.88 |
| Total income | $444,301.46 | $571,145.56 | $488,424.38 |

The average carrying price of copper for the quarter was 14.833c., compared with 15.415c. for the previous quarter and 15.476c. for the first quarter.

## Utah Copper Co.

A report of the Utah Copper Co. for the third quarter of 1923 states that the total net production of copper from all sources was 59,084,546 lb., as follows:

| Third Quarter, 1923 | Pounds | Second Quarter, 1923 | Pounds | First Quarter, 1923 | Pounds |
|---|---|---|---|---|---|
| July | 19,529,362 | April | 14,162,164 | January | 11,214,785 |
| August | 20,521,352 | May | 16,547,445 | February | 9,760,544 |
| September | 19,033,832 | June | 16,936,814 | March | 12,127,861 |
| Total | 59,084,546 | | 47,646,423 | | 33,103,190 |
| Average monthly production | 19,694,849 | | 15,882,141 | | 11,034,397 |

During the quarter the Arthur plant treated 1,794,100 dry tons of ore and the Magna plant 1,548,900 dry tons, a total for both plants of 3,343,000 dry tons, or an increase of 719,300 tons compared with the previous quarter.

The average grade of ore treated at the mills was 1.12 per cent copper, and the average mill recovery of copper in the form of concentrate was 82 per cent of that contained in the ore, compared with an average grade of 1.15 per cent and a mill recovery of 82 per cent respectively, for the previous quarter.

The average cost per net pound of copper produced, including all fixed and general charges except depreciation, and after crediting gold and silver and miscellaneous earnings, was 8.051c. compared with 8.077c. for the preceding quarter. The value of gold and silver recovered and the miscellaneous earnings amounted to 1.077c. per lb. of copper, compared with 1.266c. for the previous quarter.

The following tabulation shows the financial results of the company's operations:

| | Third Quarter 1923 | Second Quarter 1923 | First Quarter 1923 |
|---|---|---|---|
| Net profit from copper production | $3,398,478.88 | $2,553,633.66 | $1,797,521.47 |
| Miscellaneous income, including gold and silver | 636,616.64 | 603,355.03 | 443,590.20 |
| Bingham & Garfield Ry. Co. dividend | ..... | 200,000.00 | ..... |
| Total income | $4,035,095.52 | $3,356,988.69 | $2,241,111.67 |

Earnings for the third quarter are computed on the basis of 14.88c. per lb. for copper, compared with 14.723c. for the previous quarter and 15.595c. for the first quarter. A quarterly distribution to stockholders of $1 per share was made on Sept. 29, 1923, and amounted to $1,624,490.

The total capping removed during the quarter was 664,218 cu.yd., compared with 638,221 cu.yd. for the previous quarter. The ore-delivery department transported a total of 3,510,079 tons of ore, being an average of 38,153 tons per diem, compared with 2,796,859 tons and 30,734 tons, respectively, for the previous quarter. The Bingham & Garfield Ry. Co. transported a total of 367,867 tons of freight, or an average of 3,999 tons per diem.

# Metals More Unsettled in Germany

## Only a Little Copper Available and That Being Hoarded—Aluminum Finds Little Favor as a Substitute, However

*Special Foreign Correspondence*

THE last two months have witnessed the renewed efforts of the German Republic to create a balance wheel with which to keep the economic machinery of the country going regularly amid the general decay of the currency and working efficiency. German metal manufacturers were allowed to sell their products abroad more cheaply than at home in order to collect foreign currencies; coal taxes were raised so as to reduce working costs, and, last but not least, the discredited mark was substituted in the interior traffic by other forms of money. The so-called gold loan is supposed to become the instrument of an anticipated new gold currency based upon the United States dollar. Thus far, however, neither dumping nor the creation of new payment mediums has contributed to any enlivening of the metal business in Germany. On the contrary, its volume has further narrowed, on account of labor and overhead charges, which are much above the general world level because there is insufficient stable money. The metal community is especially disappointed at the developments of things in the tin-plate and galvanizing industries, and the numerous rolling mills for copper and lead of the Ruhr and Rhine districts where production is still hardly 30 per cent of that of December, 1922. On the whole, the copper business has almost vanished because of lock-outs and labor quarrels in the sheet and wire industries and the heavy financial load of the public utilities.

The rôle which the North German ports used to play as transit places for goods forwarded into the succession states of Austria and German-Austria herself has been minimized by the increased freight "multipliers" (indices) of the railways, which are diverting overseas travel to the port of Trieste. No doubt this fact will be reflected later on in the statistical returns on metal imports to this country. Another contributing factor for the diminution of copper consumption is its cost, for it is quoted 20 or more per cent above New York parity. It is difficult to import the cheaper commodity from abroad, owing to the lack of foreign payment mediums among consumers. On the other hand, the mining and smelting companies have accustomed themselves to export metals in a half-finished form into countries with currencies which range somewhat better than say, the Polish one—for instance to Jugoslavia and Rumania, where ready customers are found; so that the balance which remains for the requirements of Germany is small. In such a position are the affiliations of the Metallgesellschaft, the Aron Hirsch concerns, and the Mansfeld Copper Co. of Eisleben.

### German Supplies of Copper Low

The latter has now a series of rolling mills for the manufacture of copper sheets of different grades and of silver plates from its ores, whereas the slabs, which formerly found ever-ready markets in Germany herself, are now somewhat neglected on account of money difficulties of the buyers, who have been compelled to liquidate their holdings of copper warrants on warehouses of Rotterdam and certain British ports which were taken up on the eve of the Ruhr occupation in January, in order to put themselves in funds. Germany is now almost stripped bare of copper, and the visible supplies thereof may be roughly computed at 5,000 tons, which, however, are being mostly hoarded as a costly commodity in a speculative sense. The speculative mood has taken possession of the users, too, the latter preferring to deal in metals to working them up, with the result that there are now more metal jobbers than users in the country. The metal changes hands many times before reaching the stage of manufacture.

German consumers in general are still fond of the red metal, to the detriment of aluminum, which is still being boosted by that supreme body, the Metallwirtschaftsbund of Berlin, that controls the export and import of metals in Germany. Despite the fact that the contract terms for aluminum are handled in a very liberal manner and that the real price of the domestic aluminum is 20 to 30 centimes (Swiss) cheaper than that of the British Aluminum Co. or the Neuhausen Co., the use of aluminum is mostly limited to kitchen utensils and to the automobile industries, whereas for long duration purposes copper scrap is being eagerly turned into applicable forms. No wonder, therefore, that the Hessian bauxite mining works have been forced to cease operations and that the volume of German aluminum production is for the time being around 600 tons per month, or perhaps less. The Lautawerke are turning out 200 tons or thereabouts, Bitterfeld and its affiliations hardly more, and the Rhenish Erftwerk has an uphill fight against the manifold difficulties arising from the occupation.

### Only One Aluminum Producer To Use Water Power

In passing it may be remarked that the Bavarian Innwerk, which is in course of erection, will be the only one among the aluminum works of Germany to be placed on water-power and not on electricity derived from lignite combustion. It is believed to be ready for work in the spring of next year. A special company in which the Siemens, the A.E.G., the Giulini Brothers, and other firms participate, along with the German Empire itself, should be able to offer metal of this origin and so to satisfy the demand for the metallic stuff which prevails to such a degree that the Berlin and Hamburg metal exchanges sometimes cannot make exact quotations. The same is the case with other metals when currency rates are fluctuating and not to be ascertained accurately. That refers especially to electrolytic copper and zinc, because the quotation for the latter is now made out exclusively in terms of sterling. The export of zinc to England has almost ceased entirely, because it turns out much dearer here than abroad by pounds, while lead, which—for reasons set forth here in former reports—is a highly speculative metal in Germany instead of silver, exceeds the London parity by 50 to 80 per cent. Indeed, short accounts always prevail, moreover. Production has now reached the poor quantity of roughly 5,000 tons a month. Smuggling of platinum is going on once more. The nickel trade is showing some signs of awakening, because the Westphalian users require it.

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# Mining Dividends in November Substantially Unchanged

The following dividends were paid by mining and metallurgical companies in November, 1923:

| Companies in the United States | Situation | Per Share | Total |
|---|---|---|---|
| American Smelting & Refining | Various | $1.25 Q | $152,495 |
| Chief Consolidated Mining, s.l. | Utah | 0.10 Q | 89,221 |
| Colorado Fuel & Iron pfd | Various | 2.00 Q | 40,000 |
| General Development | Various | 0.25 Q | 30,000 |
| Homestake Mining, g | S. D | 0.50 M | 125,580 |
| International Nickel pfd | U. S. and Ont. | 1.50 Q | 135,689 |
| Miami Copper | Ariz | 0.50 Q | 373,557 |
| New Jersey Zinc | Various | 2.00 Q | 909,328 |
| U. S. Steel pfd | Various | 1.75 Q | 6,304,919 |
| United Verde Extension, c | Ariz | 1.00 Q | 1,050,000 |
| Companies in other countries | | | |
| Amparo Mining, g.s | Jalisco | 0.30 Q | 60,000 |
| Cerro de Pasco, c.s | Peru | 1.00 Q | 898,230 |
| Coniagas, s | Ont | 0.125 SA | 100,000 |
| Dome, g | Ont | 1.00 | 476,667 |
| Hollinger Consolidated Gold | Ont | 0.05 4 wks | 246,000 |
| Lake Shore, g | Ont | 0.02 Q | 40,000 |

Q, quarterly; M, monthly; SA, semiannually; c, copper; l, lead; g, gold; s, silve

The only change from the payments made three months ago is in the New Cornelia distribution, which was passed. The New Cornelia paid no dividends in 1921, but beginning with February, 1922, has made a quarterly distribution of 25c. a share, or $450,000 a quarter, until the recent decision to forego the usual November payment. The Dome dividend would have normally been payable last month, but the stock has been reorganized and the dividend was made payable Nov. 1. Share certificates should be sent to the Empire Trust Co., New York, for exchange, on the basis of two new shares for each share of the old.

# MINING STOCKS

## Week Ended November 17, 1923

| Stock | Exch. | High | Low | Last | | Last Div. |
|---|---|---|---|---|---|---|
| **COPPER** | | | | | | |
| Ahmeek | Boston | ... | ... | 58 | June 23, Q | $1.50 |
| Alaska-Br. Col. | N. Y. Curb | *86 | *68 | *85 | ..... | .... |
| Alloues | Boston | ... | ... | *16 | Mar. '19 | 1.00 |
| Anaconda | New York | 38⅛ | 36¼ | 36⅜ | Se.15, Oc.22, Q | 0.75 |
| Arcadian Consol. | Boston | 2⅜ | 2¼ | 2¼ | ..... | .... |
| Ariz. Com'l | Boston | 9 | 8 | 8 | July '23, | 0.50 |
| Calaveras | N. Y. Curb | 2¼ | 2¼ | 2¼ | ..... | .... |
| Calumet & Arizona | Boston | 46¼ | 45 | 45 | Se. 7, Se. 24, | 1.00 |
| Cal. & Hecla (New) | Boston | 20 | 18½ | 18⅜ | June '23, Q | 10.00 |
| Centennial | Boston | ... | ... | 7 | Dec. '18, SA | 1.00 |
| Cerro de Pasco | New York | 42 | 40⅛ | 40½ | Oc.18, No.1, Q | 1.00 |
| Chile Copper | New York | 27⅜ | 26⅜ | 27 | De.1, De.29, Q | 0.62½ |
| Chino | New York | 18⅛ | 16⅜ | 17 | Sept. '20, Q | 0.37½ |
| Con. Cop.Min.(New) | N. Y. Curb | 1 7/16 | 1 | 1⅛ | ..... | .... |
| Copper Range | Boston | 27¼ | 24¼ | 24½ | May '23, Q | 1.00 |
| Crystal Copper | Boston Curb | 74 | 65 | 71 | ..... | .... |
| Davis-Daly | Boston | 3⅛ | 2⅜ | 3 | Mar. '20, Q | 0.25 |
| East Butte | Boston | 5⅜ | 5⅛ | 5⅛ | Dec. '19, A | 0.50 |
| First National | Boston Curb | 30 | 26 | 30 | Feb. '19, SA | 0.15 |
| Franklin | Boston | 1⅛ | *99 | 1⅛ | ..... | .... |
| Gadsden Copper | Boston Curb | *40 | *40 | *40 | ..... | .... |
| Granby Consol. | New York | 16⅛ | 14⅛ | 14⅛ | May '19, Q | 1.25 |
| Greene-Cananea | New York | 16⅛ | 15⅛ | 16⅛ | Nov. '20, Q | 0.50 |
| Hancock | Boston | 1⅛ | 1⅛ | 1⅛ | ..... | .... |
| Howe Sound | N. Y. Curb | 2⅛ | 2⅛ | 2⅞ | Oc.1, Oc.15 | 0.05 |
| Inspiration Consol. | New York | 29 | 27⅛ | 27⅜ | Se.13, Oc.1 Q | 0.50 |
| Iron Cap | Boston Curb | 4 | 4 | 4 | May 23, K | 0.15 |
| Isle Royale | Boston | 21⅛ | 20 | 20 | Se. 1, Se. 15, | 0.50 |
| Kennecott | New York | 35⅛ | 33⅛ | 33⅜ | Se. 7, Oc. 1, | 0.75 |
| Keweenaw | Boston | *85 | *80 | *80 | ..... | .... |
| Lake Copper | Boston | 1⅛ | 1⅛ | 1⅛ | ..... | .... |
| Magma Copper | New York | 31⅛ | 30⅛ | 30⅛ | Jan. '19, Q | 0.50 |
| Mason Valley | N. Y. Curb | 1⅜ | 1⅜ | 1⅜ | ..... | .... |
| Mass Consolidated | Boston | 1⅛ | 1⅛ | 1⅛ | Nov. '17, Q | 1.00 |
| Miami Copper | New York | 22⅛ | 21⅛ | 21⅜ | No. 1, No. 15, Q | 0.50 |
| Michigan | Boston | 1⅛ | 1⅛ | 1⅛ | ..... | .... |
| Mohawk | Boston | *37⅛ | *33 | *33 | Se. 22, Oc. 13, | 1.00 |
| Mother Lode Coa. | New York | 9⅜ | 8⅛ | 8⅜ | Je. 8, Je. 30, Q | 0.50 |
| Nevada Consol. | New York | 12⅛ | 11⅛ | 11⅝ | Sept. '20, Q | 0.25 |
| New Cornelia | Boston | *17⅛ | *15⅝ | *15⅝ | Au. 3, Au, 20, Q | 0.25 |
| New Dominion | N. Y. Curb | 3 | 2⅝ | 2⅞ | ..... | .... |
| North Butte | Boston | 3⅛ | 2⅛ | 2⅛ | Oct. '18, Q | 0.25 |
| Ohio Copper | N. Y. Curb | *92 | *84 | *85 | ..... | .... |
| Old Dominion | Boston | 18 | 16⅛ | 16⅛ | Dec. '18, Q | 1.00 |
| Osceola | Boston | ... | ... | 31⅛ | June '23, Q | 1.00 |
| Phelps Dodge | Open Mar. | †145 | †135 | ... | Se. 20, Oc. 2 Q | 1.00 |
| Quincy | Boston | 26 | 21 | 22 | Mar. '20, Q | 1.00 |
| Ray Consolidated | New York | 12⅞ | 12 | 12⅜ | Dec. '20, Q | 0.25 |
| Ray Hercules | N. Y. Curb | *20 | *20 | *20 | ..... | .... |
| St. Mary's Min. Ld. | Boston | *34 | *31⅛ | *31⅛ | No.9, De.11, K | 1.00 |
| Seneca Copper | New York | 7 | 5⅛ | 5⅛ | ..... | .... |
| Shannon | Boston | *80 | *40 | *45 | Nov. '17, Q | 0.25 |
| Shattuck Arizona | New York | 7 | 6 | 6 | Jan. '20, Q | 0.25 |
| South Lake | Boston | ... | ... | 1⅛ | ..... | .... |
| Superior & Boston | Boston | 1⅜ | 1⅜ | 1⅜ | ..... | .... |
| Tenn. C. & C. cfs. | New York | 9⅛ | 8⅜ | 8⅞ | Se. 29, Oc.15, Q | 0.25 |
| Tuolumne | Boston | 1 | *60 | *60 | May '13, | 0.10 |
| United Verde Ex. | N. Y. Curb | 27⅜ | 27 | 27 | Oc. 5, No.1, Q | 1.00 |
| Utah Consol. | Boston | *80 | *62 | *70 | Sept '18, | 0.25 |
| Utah Copper | New York | 63¼ | 61⅛ | 61⅛ | Se.14, Se.29, Q | 1.00 |
| Utah Metal & T. | Boston | *45 | *40 | *45 | Dec. '17, | 0.30 |
| Victoria | Boston | 1⅜ | 1⅜ | 1⅜ | ..... | .... |
| Winona | Boston | *25 | *25 | *25 | ..... | .... |
| Wolverine | Boston | 6¼ | 6 | 6¼ | ..... | .... |
| **NICKEL-COPPER** | | | | | | |
| Internat. Nickel | New York | 12 | 11⅛ | 11⅛ | Mar.' 19, | 0.50 |
| Internat. Nickelpfd. | New York | 80⅛ | 80⅛ | 80⅛ | Oc.11, No.1 Q. | 1.50 |
| **LEAD** | | | | | | |
| Ahumada | Boston Curb | 5⅛ | 5⅛ | 5⅛ | ..... | .... |
| Carnegie Lead & Zinc | Pittsburgh | 1⅛ | 1⅛ | 1⅛ | ..... | .... |
| National Lead | New York | 125⅛ | 124 | 125⅛ | De.14, De.31, Q | 2.00 |
| National Lead pfd. | New York | 112 | 112 | 112 | Au. 24, Se.15 Q | 1.75 |
| St. Joseph Lead | New York | 20⅛ | 19¾ | 20 | Se.9, Se.20 Q, X | 0.50 |
| **ZINC** | | | | | | |
| Am. Z. L. & S. | New York | 8⅛ | 8 | 8 | May '20, | 1.00 |
| Am. Z. L. & S. pfd. | New York | 30 | 28 | 28 | Nov. '20, Q | 1.50 |
| Butte C. & Z. | New York | 6 | 5⅛ | 5⅛ | Mar. '23, | 0.50 |
| Butte & Superior | New York | 17 | 15 | 15 | Je. 15, Je. 30, Q | 0.50 |
| Callahan Zn-Ld. | New York | 4⅛ | 4 | 4 | Dec. '20, Q | 0.50 |
| New Jersey Zn. | N. Y. Curb | 145⅛ | 145⅛ | 145⅛ | Oc.31, No.10, Q | 2.00 |
| United Zinc | N. Y. Curb | *50 | *50 | *50 | ..... | .... |
| Yellow Pine | Los Angeles | *75 | *75 | *75 | June '23, Q | 0.03 |
| **SILVER** | | | | | | |
| Alvarado | N. Y. Curb | 2⅛ | 2⅛ | 2⅛ | ..... | .... |
| Batopilas Mining | New York | ... | ... | ... | Dec. '07, I | 0.12½ |
| Beaver Consol. | Toronto | *24½ | *23 | *23 | May '20, K | 0.03 |
| Candelaria | N. Y. Curb | *4 | *4 | *4 | ..... | .... |
| Castle-Trethewey | Toronto | *41 | *40 | *40 | ..... | .... |
| Coniagas | Toronto | 2.10 | 2.10 | 2.10 | Oc.19, No.1, '23 | 0.02½ |
| Crown Reserve | Toronto | *63⅓ | *58 | *62' | Jan. 17, | 0.05 |
| Kerr Lake | N. Y. Curb | 2⅛ | 2⅛ | 2⅛ | Oc.1, Oc. 15, Q | 0.12½ |
| La Rose | Toronto | *24 | *24 | *24 | Apr. '22, | 0.10 |
| McKinley-Dar.-Sav. | Toronto | *15⅓ | *13⅓ | *14 | Oct. '20, Q | 0.03 |
| Mining Corp. Can. | Toronto | 2.88 | 2.78 | 2.80 | Sept. '20, Q | 0.12½ |
| Nipissing | N. Y. Curb | 5⅜ | 5⅜ | 5⅜ | Se.3, Oc.17, Q | 0.30 |
| Ontario Silver | New York | ... | ... | 6⅓ | Jan. '19, Q | 0.50 |
| Temiskaming | Toronto | *32⅓ | *32 | *32⅓ | Jan. '20, K | 0.04 |

| Stock | Exch. | High | Low | Last | | Last Div. |
|---|---|---|---|---|---|---|
| **GOLD** | | | | | | |
| Alaska Gold | New York | ⅛ | ⅛ | ⅛ | ..... | .... |
| Alaska Juneau | New York | 1⅛ | 1 | 1 | ..... | .... |
| Boundary Red M. | N. Y. Curb | ... | ... | *12 | ..... | .... |
| Carson Hill | Boston | 4⅛ | 3⅞ | 3⅞ | ..... | .... |
| Cresson Consol. G. | N. Y. Curb | 3⅛ | 3 7/16 | 3 7/16 | Se.30, Oc.10, Q | 0.10 |
| Dome Mines | New York | 36⅜ | 36¼ | 36¼ | Oc.12, No.1, Q | 1.75 |
| Golden Cycle | Colo. Springs | ... | ... | 1.09 | Dec. '22, Q | 0.02 |
| Hollinger Consol. | Toronto | 11.50 | 11.35 | 11.35 | No.15, De.3, | 0.05 |
| Homestake Mining | New York | 60½ | 60⅛ | 60¼ | No.20, No.26 M | 0.50 |
| Kirkland Lake | Toronto | *33 | *30⅛ | *32 | ..... | .... |
| Lake Shore | Toronto | 3.60 | 3.54 | 3.57 | No.1, No.15'23 Q | 0.02 |
| McIntyre-Porcupine | New York | 16⅛ | 16 | 16 | De. 1, Ja. 2, | 0.25 |
| Portland | Colo. Springs | ... | ... | *35 | Oct. '20, Q | 0.01 |
| Teck-Hughes | N. Y. Curb | 1 3/16 | 1⅛ | 1⅛ | ..... | .... |
| Tom Reed | Los Angeles | *54 | *45 | *54 | Dec. '19, | 0.02 |
| United Eastern | N. Y. Curb | 1 3/16 | 1 7/16 | 1 7/16 | Oc.8, Oc.28, Q | 0.15 |
| Vipond Cons. | Toronto | *92 | *90 | *91 | ..... | .... |
| Wright-Hargreaves | Toronto | 3.10 | 3.00 | 3.00 | Se.15, Oc.1, Q | 0.02½ |
| Yukon Gold | N. Y. Curb | *75 | *60 | *70 | June '18, | 0.02½ |
| **GOLD AND SILVER** | | | | | | |
| Boston-Mont. Corp. | N. Y. Curb | *19 | *16 | *17 | ..... | .... |
| Con. Cortez | N. Y. Curb | *49 | *48 | *49 | ..... | .... |
| Con. Virginia | San Francisco | 10⅛ | 9⅛ | 10⅛ | ..... | .... |
| Continental Mines | N. Y. Curb | ... | ... | 4⅛ | ..... | .... |
| Dolores Esperanza | N. Y. Curb | *90 | *85 | *85 | Jy. 1, Jy.10 Q | 0.05 |
| Jib Consol | N. Y. Curb | ... | ... | *65 | ..... | .... |
| Tonopah Belmont | N. Y. Curb | *59 | *35 | *36 | Apr. '23, Q | 0.05 |
| Tonopah Divide | N. Y. Curb | ... | ... | *50 | Se.22, Oc.10 | 0.10 |
| Tonopah Extension | N. Y. Curb | 1⅛ | 1⅛ | 1⅛ | De. 11, Ja. 1 | 0.05 |
| Tonopah Mining | N. Y. Curb | 1⅜ | 1⅜ | 1⅜ | Se. 30, Oc. 1 | 0.07½ |
| Unity Gold | N. Y. Curb | 3⅛ | 3 | 3¼ | ..... | .... |
| West End Consol. | N. Y. Curb | *71 | *68 | *68 | Mar. '23, Q | 0.05 |
| **SILVER-LEAD** | | | | | | |
| Bingham Mines | Boston | 17 | 17 | 17 | Sept. 19, Q | 0.25 |
| Cardiff M. & M. | Salt Lake | ... | ... | *81 | Dec. '20, | 0.15 |
| Chief Consol. | Boston Curb | 3⅜ | 3⅛ | 3⅜ | Au. 1, '23, Q | 0.10 |
| Columbus Rexall | Salt Lake | *23 | *21 | *22 | Aug. '22, | 0.03 |
| Consol. M. & S. | Montreal | 25½ | 25 | 25 | Oct. '20, Q | 0.62½ |
| Erupcion | Boston Curb | 2⅛ | 1⅛ | 2⅛ | Se. 15, Oc. 2 | 0.125 |
| Federal M. & S. | New York | 13 | 12 | 12 | Jan., '09, | 1.50 |
| Federal M. & S. pfd. | New York | 45 | 43⅜ | 43⅜ | No. 26, De. 15, | 1.75 |
| Florence Silver | Spokane | *15 | *12⅛ | *13⅛ | Apr. '19, Q.X | 0.01 |
| Hecla Mining | N. Y. Curb | 8⅜ | 8⅛ | 8⅛ | Au.15, Se.15 | 0.15⅛ |
| Iron Blossom Con. | N. Y. Curb | *32 | *32 | *32 | Oct.25, '23, | 0.02 |
| Marsh Mines | N. Y. Curb | *11 | *11 | *11 | June '21, I | 0.02½ |
| Park City | Salt Lake | 3.70 | 3.70 | 3.70 | Se.15, Oc.1 Q | 0.12 |
| Park Utah | N. Y. Curb | .... | .... | 3 | Se.15, Oc.1 Q | 0.15½ |
| Prince Consol. | Salt Lake | ... | ... | *75 | Nov. '17, | 0.02 |
| Silversmith | Spokane | *35 | *34 | *34½ | Oc. 1, Oc. 10 | 0.01 |
| Simon Silver-Lead | N. Y. Curb | *5 | *4 | *4 | ..... | .... |
| Snowstorm Silver-L. | N. Y. Curb | ... | ... | *46 | ..... | .... |
| Tamarack-Custer | Spokane | 1.40 | 1.38 | 1.38 | Se.30, Oc.1, K | 0.02 |
| Tintic Standard | Salt Lake | 3.57½ | 3.50 | 3.57½ | Se. 24, Se. 29 | 0.15 |
| Utah-Apex | Boston | 3 | 2⅛ | 2⅛ | June '23, Q.X | 0.50 |
| **IRON** | | | | | | |
| Bethlehem Steel | New York | 51⅜ | 48⅜ | 49¼ | De.1, Ja.2, Q | 1.25 |
| Char. Iron | Detroit | ¾ | ⅝ | ⅝ | ..... | .... |
| Char. Iron pfd | Detroit | 1⅛ | 1⅛ | 1⅛ | ..... | .... |
| Colorado Fuel & Iron | New York | 23⅛ | 22⅛ | 22⅛ | No.10, No.26 Q | 2.00 |
| Col. Fuel & Iron pfd. | New York | ... | ... | 102 | Feb.'23, Q | 2.00 |
| Gt. North'n Iron Ore | New York | 32 | 30 | 30½ | Apr. '23 | 1.00 |
| Inland Steel | N. Y. Curb | ... | ... | 46¼ | No.15, De.1Q | 0.62½ |
| Mesabi Iron | N. Y. Curb | ... | ... | 5 | ..... | .... |
| Replogle Steel | New York | 10⅛ | 9⅛ | 9⅛ | ..... | .... |
| Republic I. & S. | New York | 48 | 45⅛ | 45⅛ | May '21 | 1.50 |
| Republic I. S. pfd. | New York | 90⅛ | 90 | 90⅛ | Se.15, Oc.1 Q | 3.75 |
| Sloss-Sheffield S. & I. | New York | 51⅛ | 48 | 48 | Feb.'21, | 1.50 |
| Sloss-Shef. S. & I. pfd. | New York | 80⅛ | 79 | 80⅛ | De.20, Ja.2, Q | 1.75 |
| U. S. Steel | New York | 95⅛ | 91⅛ | 92⅛ | No.29, De.29, Q | 1.50 |
| U. S. Steel pfd. | New York | 120⅛ | 118⅛ | 118⅛ | No.4, No.28, Q | 1.75 |
| Virginia I. C. & C. | New York | 54 | 53 | 53 | Je.16, Jy. 2 | 2.00 |
| Virginia I.C.&C.pfd. | New York | ... | ... | 81 | Je.16, Jy. 2 | 2.50 |
| **VANADIUM** | | | | | | |
| Vanadium Corp. | New York | 31⅛ | 28⅜ | 29 | Jan. '21, Q | 1.00 |
| **ASBESTOS** | | | | | | |
| Asbestos Corp. | Montreal | 30 | 26 | 26 | Se.29, Oc.15 Q | 1.00 |
| Asbestos Corp. pfd. | Montreal | 60 | 58 | 59 | Se.29, Oc.15 Q | 1.50 |
| **SULPHUR** | | | | | | |
| Freeport Texas | New York | 11⅛ | 11 | 11⅛ | Nov. '19, Q | 1.00 |
| Texas Gulf | New York | 63⅛ | 60⅛ | 60⅞ | De.1, De.15 QX | 2.00 |
| **PLATINUM** | | | | | | |
| So. Am. Gold & P. | N. Y. Curb | 3⅛ | 3⅛ | 3⅛ | ..... ..... | .... |
| **MINING, SMELTING AND REFINING** | | | | | | |
| Amer. Metal | New York | 45⅛ | 45 | 45⅛ | No. 17, De.1, Q | 0.75 |
| Amer. Metal pfd. | New York | ... | ... | 110 | No.19, De 1, Q | 1.75 |
| Amer. Sm. & Ref. | New York | 59⅜ | 56⅛ | 56⅛ | Oc.11, No.1, Q | 1.25 |
| Amer. Sm.& Ref. pfd | New York | 96 | 95 | 95 | No.9, De.1, | 1.75 |
| U. S. Sm. R. & M. | New York | 23⅛ | 21 | 21⅛ | Jan. '21, Q | 0.50 |
| U.S. Sm.R.& M. pfd. | New York | 40⅝ | 40 | 40 | Oc.8, Oc.15, Q | 0.87½ |

*Cents per share. †Bid or asked. Q, Quarterly. SA, Semi-annually. M, Monthly. K, Irregular. I. Initial. X, Includes extra.

Toronto quotations courtesy Arthur E. Moysey; Spokane, Pohlman Investment Co.; Salt Lake, Stock and Mining Exchange; Los Angeles, Chamber of Mines and Oil; Colorado Springs, Colorado Springs Stock Exchange.

## NEW MACHINERY AND INVENTIONS

### A Blueprint Drier

Eight linear feet of dripping wet prints a minute can be dried, it is claimed, in a sheet drier that has recently been devised. The new machine is thermostatically controlled and is provided with a copper cylinder, in which the correct temperature is maintained at all times by means of the thermostat. It is this cylinder which makes it possible to start with prints that are dripping wet and have them come out thoroughly dried and without wrinkles. In designing the machine the feeding apron has been given a downward slant. This prevents the water from collecting where the cylinder and the belt meet, thus doing away with one of the chief reasons for the wrinkling of prints. Another feature is the asbestos apron, which does away with the difficulty of scorched belts, which is often encountered in machines of this type and which increases the cost of upkeep.

The new sheet drier described is made by the C. F. Pease Company, 813 North Franklin St., Chicago, which has recently prepared a catalog of blueprint machinery (M-230) for distribution to any who may be interested in the device.

# Developments in Centrifugal Concentration

## Promising Results Obtained With New Experimental and Test Machine

ANY ONE who has experimented with a centrifugal device knows that a concentrate can be deposited on the inside of a revolving cone or cylinder having appropriate pockets or riffles; the efficiency, of course, depends on the speed, the size, the internal design of the bowl, and the time required for the ore to travel through, or from the bottom to the top. One of the great difficulties with the centrifugal concentrator has been that it could not be constructed to run continuously and discharge tailing at one place and concentrate at another. Up to the present time it has been necessary to operate intermittently, in successive periods of feeding, washing, slowing down, and discharge of the concentrate, or some similar order. This method results in difficulties of operation that more than outweigh the advantages of centrifugal separation.

Efforts have been made to discharge a concentrate through the side of the revolving bowl while it was in motion—that is, through small holes. Results, although encouraging on small-scale tests and with carefully sized feed, did not prove successful. Openings of this character had to be restricted—the material, in passing through at a rapid rate, made the opening too large; sand and even slime had a tendency to bridge over and cover the opening in the side.

The Centrifugal National Concentrator Co., with offices at 305-7 I. W. Hellman Building, Los Angeles, Calif., is the owner of patents covering a centrifugal concentrator invented by Charles W. Eccleston, known as the Eccleston centrifugal separator, in which concentrates are taken off at different places on the outside of the bowl, and the tailing is made to pass over the top. The method of operation will be apparent from the following description and by reference to the accompanying illustrations. The description applies to the experimental and test machine now in operation at the company's plant in Los Angeles.

The main concentrating bowl, of brass, is slightly cone-shaped, being 6 in. in diameter at the bottom, 8½ in. in diameter at the top, and 13 in. high. Triangular pockets about 1 in. deep are formed on the inside of the bowl at intervals of every 2 in., the small machine thus having six pockets. A slot ¼ in. wide is cut through and entirely around the bowl except where six 1-in. segments are left to hold the bowl together. These slots are cut at the apex of the triangular pockets and are provided for the discharge of the concentrate. Obviously, if the bowl were operated in this condition all the ma-

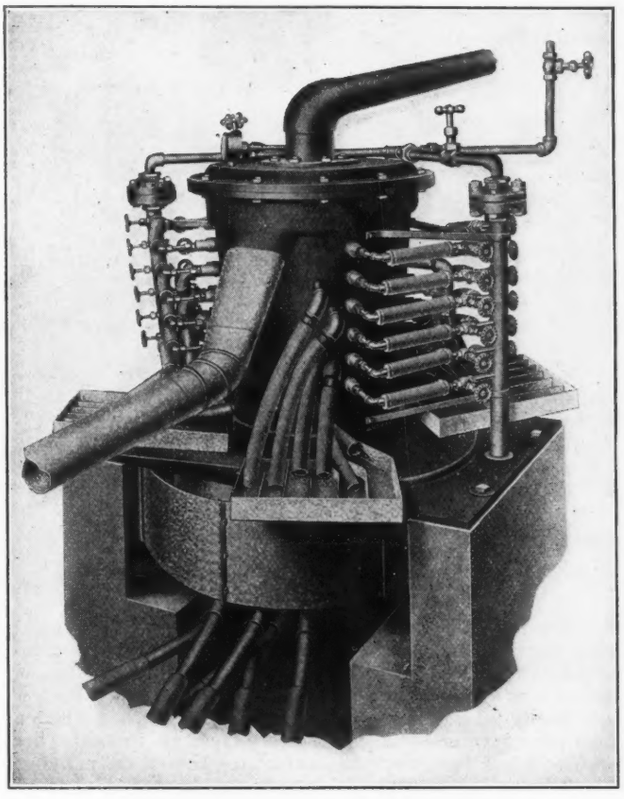


*Fig. 1—Exterior view of centrifugal separator with six skirt rings*

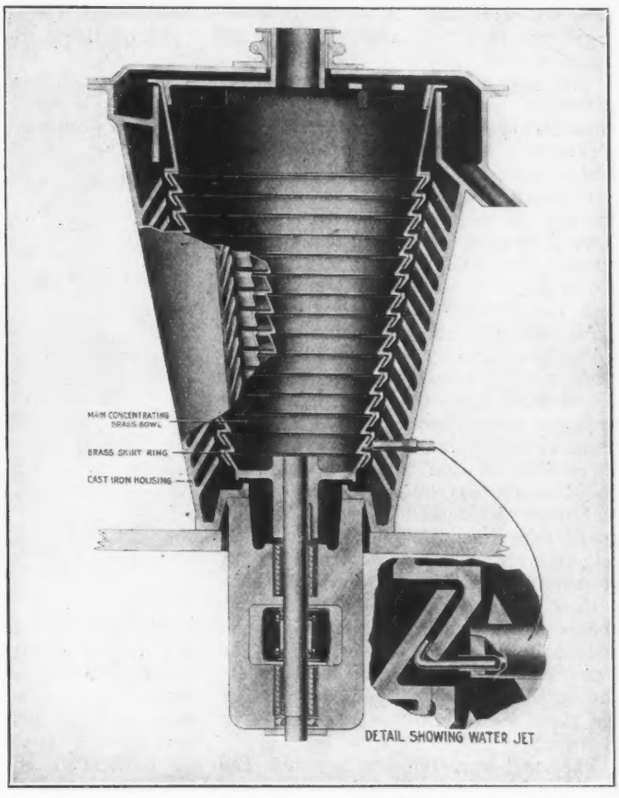



*Fig. 2—Phantom view of fifteen-ring separator*

terial would discharge through the slots; therefore a method of controlling this discharge had to be devised, which is as follows: A brass ring is fastened to the outside of the bowl just over the slot extending down and toward the center of the bowl. When this ring is in position any material that passes through the slot hits the ring and must turn down and back toward the center in order to escape. When rings and bowl are properly designed, material cannot escape at the bottom of the ring, because centrifugal force will not allow it to come back toward the center. All action is directly outward. One of the rings covers each slot, and there are thus six rings and six discharge openings provided on the experimental machine.

The next step in the process is to secure a controlled discharge of the concentrates. This is accomplished by means of a needle-like stream of water under pressure, introduced from the outside under each of the rings, which washes the concentrate down and allows it to escape at the bottom of the rings. The amount of concentrate secured depends on the water pressure and the amount of water allowed to escape through the jet openings. This latter is accurately controlled by means of a needle valve. It has also been found that more than one jet can be used on each ring, and that the jets seem to aid each other. For instance, three jets on one ring will take out about six times as much concentrate as any one jet working separately. The small experimental machine has four jets on each ring spaced on the quarter, or twenty-four jets on the six rings, each of which is controlled by its own needle valve and can be used independently of all the other jets. The pipes supplying the water to the jets can also be removed and replaced at the same time that the machine is in operation.

The cast-iron housing around the machine is of ingenious design, in one piece; it contains twenty-four compartments, so that the concentrate from each of the water jets is kept separate and the operator can tell at a glance what each jet is doing. The revolving bowl is mounted on a vertical shaft that runs in two babbitted bearings, with the weight taken on a ball-thrust bearing at the bottom. A central Hyatt roller bearing is provided at the top to keep the bowl in line and insure true running. The revolving bowl and the outside rings are accurately machined and balanced. The housing is also accurately machined on the inside and at the top and bottom. The bowl revolves at a speed of 600 to 650 r.p.m. and requires little power. The capacity of this small machine averages twenty-five tons per twenty-four hours.

The feed is put into the machine through the hollow shaft at the top, and drops to the bottom of the bowl, where it is picked up by the revolving bowl and distributed around the sides. It then travels up the bowl, fills the triangular pockets and passes over the top into the tailing launder at the top of the housing. Water at a pressure of 140 to 160 lb. is furnished by a small Fairbanks-Morse plunger pump, and the operator opens the discharging jets one by one and adjusts them until a good concentrate is being produced. After the machine has been bedded with concentrates and adjusted, it requires little attention; one operator can attend to several machines. The concentrates leave the housing through ¼-in. pipes and run down into small pans, where they are visible to the operator. From there they run into the launder and to any point desired. The machine occupies a space about 4x4 ft., and is noiseless in operation.

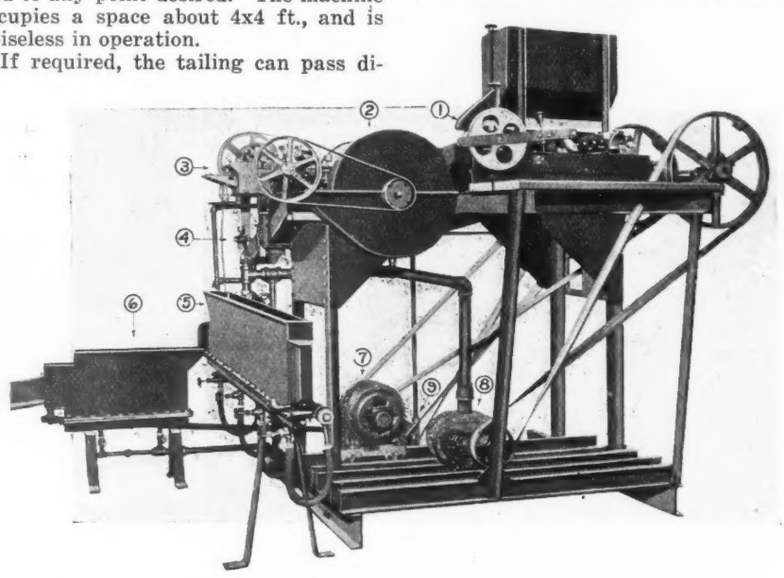
If required, the tailing can pass directly into the top of another machine, and so on. This applies particularly to complex ores or to ore having much concentrate. The concentrates from any machine, group of machines, or any group of concentrates from several machines, can be re-treated in a separate machine, so that the ultimate product is as clean as possible.

Tests have shown that this machine will do work that cannot be accomplished in any other way; and will handle ores, such as those containing lead carbonate, heretofore considered impossible. Successful tests have been made on ores carrying gold, silver, copper, lead, and zinc. Machines can be built of any desirable size, as to diameter and height, the capacity being proportional to the concentrating surface provided. The larger the diameter the fewer are the revolutions per minute required for operation; at the same time it will probably be possible to employ more discharging jets to remove the concentrates, because more space will be available.

The accompanying halftone (Fig. 1) represents the experimental machine with six skirt rings, having a daily capacity of twenty-five tons. Fig. 2 shows a machine with fifteen skirt rings, having a daily capacity of 100 tons. Both machines are of similar construction .

## Continuous Automatic Flotation Plant for Laboratory

A laboratory continuous fine grinding and flotation plant, with a capacity of 20 to 30 lb. of ore per hour and including nine different machines with the necessary accessories, has been developed by the General Engineering Co., 159 Pierpont St., Salt Lake City, Utah. It is capable of continuous operation and can be used to check, under mill conditions, the results obtained in batch-type laboratory flotation units. It is automatic. One of these plants has been operated for nine months in the company's laboratories. Mining companies doing their own experimental work and mining schools will find it useful.




*Laboratory flotation plant for continuous and automatic operation*

The nine machines which comprise this plant are listed as follows (the numbers refer to the accompanying cut):

No. 1. Automatic ore feeder, hopper capacity 200 lb. crushed ore.

No. 2. Ball mill, 12 in. diameter x 16 in. long, with scoop, scoop-box, diaphragm, lifters, etc.

No. 3. Split-drop, 2-compartment oil and reagent feeder.

No. 4. Drag classifier, 4 in. wide by 38 in. long, slope 4 in. in 12 in.

No. 5. Rougher flotation cell, 72 in. long by 2 in. wide.

No. 6. Cleaner flotation cell, 24 in. long by 2 in. wide.

No. 7. 3 hp., 220 volt 60 cycle, G. E. a.c. motor.

No. 8. No. 3½ Acme blower, capacity 45 cu.ft. air per minute at 5 lb. pressure.

No. 9 ¾-in. centrifugal pump for returning cleaner tails into circuit.

All necessary shafting, pulleys, boxes, belting, water and air pumping, and an equalizing steel water tank are included in the equipment.

Over-all dimensions are 7 ft. 8 in. wide, 11 ft. 9 in. long, 7 ft. 10½ in. high from floor to top of feeder hopper.